

# Research Progress on the Depression Status and Nursing Intervention in Patients after Percutaneous Coronary Intervention

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**Abstract:** Percutaneous coronary intervention (PCI) is an effective treatment method for myocardial ischemic necrosis. Postoperative depression caused by PCI stress will adversely affect the prognosis of patients. This article reviews the current status and influencing factors of postoperative depression after PCI and summarizes the corresponding nursing interventions, to provide a literature reference to implement effective nursing interventions for depressed patients after clinical PCI.

**Keywords:** Coronary heart disease; Percutaneous coronary intervention; Patients with coronary heart disease; Depression; Nursing interventions; Research progress

**Online publication:** February 26, 2024

## 1. Introduction

Coronary heart disease (CHD) is a common clinical cardiovascular disease, mainly characterized by myocardial ischemia, hypoxia, and necrotic heart disease as a result of coronary atherosclerosis, coronary artery spasm, stenosis, or occlusion. In China, CHD is the second most common type of cardiovascular disease, with 11.39 million affected individuals, and the number of cases is increasing <sup>[1]</sup>. Currently, percutaneous coronary intervention (PCI) treatment is the most effective and cost-effective method to achieve coronary revascularization <sup>[2]</sup>. The number of PCI surgeries performed in China during 2021 was determined to be 1.164 million annually. The patient's myocardial ischemia and hypoxia status were significantly improved through PCI. However, postoperative clinical adverse reactions after surgery, including physical and psychological aspects must be accounted for, and depression accounts for the majority of psychological adverse reactions at 45.3% <sup>[3]</sup>. Compared with cardiovascular disease patients who did not undergo PCI, patients who underwent PCI were more likely to experience depression <sup>[4]</sup>. This could affect the patient's mental and physical health,

and delay the process of cardiac rehabilitation. In a 10-year study, Dutch scholar van Dijk<sup>[5]</sup> followed up with post-PCI patients and found that the risk of experiencing depression 10 years post-surgery was significantly increased by 77%. It is an independent risk factor for long-term mortality in post-PCI patients. Depression will reduce the patient's quality of life and affect prognosis<sup>[6]</sup>. Therefore, the current status, influencing factors, and nursing intervention measures of depression in post-PCI patients were reviewed to provide better clinical treatment for PCI, and depression care in post-PCI patients.

## **2. Current status of depression in patients after PCI**

### **2.1. Current status of depression after PCI abroad**

A study was conducted in Jordan<sup>[7]</sup> to evaluate the depressive symptoms of patients 10 days after PCI. It was found that the prevalence rate was 80%, and the incidence of moderate to severe depression was 34%. About one-third of the patients exhibit depressive symptoms, yet the clinical identification and management of these symptoms are not well-established. Korean scholars surveyed outpatients 1 month after PCI and found that nearly half of the patients experienced depression<sup>[8]</sup>. Aguayo<sup>[9]</sup> found out that within 3 months after discharge, 5.1% of patients experienced a new onset of depression post-PCI. An observational study on the changes in the psychological state of foreign patients after PCI showed that the depression level was constant for 12 months<sup>[10]</sup>, indicating that within one year after surgery, post-PCI patients were still depressed. Montesano<sup>[11]</sup> conducted a 12-month longitudinal record of 278 patients in an outpatient clinic and found that the anxiety levels of patients receiving PCI treatment significantly improved. However, the patients were still depressed.

### **2.2. Current situation of depression after PCI domestically**

With the advancement of China's medical industry and the continuous development of PCI, the psychological problems of post-PCI patients have garnered the attention of many researchers. Studies have found that in recent years, the number of patients experiencing depression after PCI in China has increased significantly<sup>[12]</sup>, and as time goes by, this depressive state usually lasts for more than one year, similar to cases in foreign countries. Liu<sup>[13]</sup> investigated 297 patients on the day before discharge and found that 66 people (22.2%) were depressed. This showed that patients were already experiencing depression and faced psychological challenges 3–5 days after surgery. Sun<sup>[14]</sup> investigated patients one week after PCI and found that the incidence of depression was as high as 43.75%. According to Lu<sup>[15]</sup>, the incidence of depression in 98 post-PCI patients was as high as 54.08%. Yang<sup>[16]</sup> investigated post-PCI patients with CHD in three hospitals in Changsha, and found that the incidence rate of post-PCI patients harboring negative emotions (including depression, anxiety, and irritability) was 63.8%, with depression being the highest at 39.6%. A 6-month longitudinal observational study<sup>[17]</sup> found that more than half of post-PCI patients experienced constant anxiety and depression for 6 months. Furthermore, the depression gradually worsened over time and adversely affected the prognosis. In addition, the recognition rate of depression in patients after PCI in some hospitals at or above the prefecture level in China is less than 20%<sup>[18]</sup>. This showed that the psychological changes of post-PCI patients are worrying and care in this area needs to be improved.

## **3. Factors influencing depression after PCI**

### **3.1. Sociodemographic factor**

Sociodemographic factors mainly include three factors. (1) Gender: Among patients who underwent PCI for CHD, women are more likely to experience depression. Statistics showed that the incidence of depression in

women is more than twice as high compared to men <sup>[19]</sup>. Edward <sup>[20]</sup> discovered that there were differences in the physical performance of men and women post-PCI. Men had better physical performance and better emotional management 6 months after PCI, while women had poorer emotional management. An Australian study showed that the female gender is an independent predictor of poor quality of life 30 days post-PCI <sup>[21]</sup>. Women's self-perception of their health status was significantly worse than that of men. Depression, anxiety, and other negative emotions were also more likely to occur during the rehabilitation and treatment. (2) Age: Li <sup>[22]</sup> found that age was one of the independent risk factors for post-PCI depression. Adults aged > 65 years old experience greater pressure as they age, where their physical functions gradually deteriorate, and their mental endurance decreases. Under the dual influence of PCI surgical stress and issues related to postoperative recovery, patients were vulnerable to depression and emotional challenges <sup>[23]</sup>; (3) Education level. Post-PCI patients with lower education statuses had poorer treatment compliance <sup>[24]</sup>, lower levels of self-efficacy <sup>[25]</sup>, and were less confident. This caused bias, which resulted in patients showcasing negative emotions during the treatment and recovery process after PCI.

### **3.2. Personality factors**

Type D personality (TDP) is considered a "sad" personality and consists of two sub-dimensions, namely social inhibition (SI) and negative affectivity (NA) <sup>[27]</sup>. TDP is often characterized by increased negative emotions and social avoidance. Relevant studies have proven that the post-PCI TDP patients are more likely to develop severe depression one year after the surgery <sup>[26]</sup>. Post-PCI patients tend to experience common problems such as restricted physical activity, pain at the intervention site, and a fear of surgery. Patients with TDP are more likely to exhibit negative attentional biases, which could lead to the development of depression and anxiety. The existence of post-PCI depression is significantly related to TDP. As compared with post-PCI non-TDP patients, the incidence of depression in post-PCI TDP patients were 4.259 times higher <sup>[28-30]</sup>.

### **3.3. Exercise habits**

The postoperative exercise status of patients is closely related to their mental health status <sup>[31]</sup>. There is a notable increase in the incidence of depression and other postoperative adverse psychological problems in CHD patients who have a fear of exercising <sup>[32]</sup>. Post-PCI patients were concerned about cardiovascular trauma, resulting in an apparent fear of exercise. The level of fear is associated with the amount and time of exercise done, which hinders cardiac recovery and increases the risk of depression. Li <sup>[33]</sup> found that the patients' compliance rate of carrying out home rehabilitation exercises one year after PCI was only 37.82%. The incidence of depression among patients who had no daily exercise after surgery was 31.7%, while the incidence of depression among PCI patients who exercised after surgery was 37.82%. In addition, the incidence rate of depression was 21.3%.

### **3.4. Disease-related factors**

Disease-related factors mainly include cardiac function class and previous PCI surgery history. Li <sup>[34]</sup> found that the cardiac function grade was positively correlated with depression. The proportion of patients with poor cardiac function admitted to the hospital was significantly higher than those with good cardiac function. This is because patients with higher cardiac function grades had increased restrictions on bodily activities <sup>[16]</sup>. Bodily functions are often related to psychology. Patients with low body functions have weak daily living abilities. They are prone to problems in everyday life and are more likely to experience feelings of frustration and uselessness. Secondly, a previous history of PCI or coronary artery bypass graft surgery (CABG) is also a risk factor for the development of depression <sup>[35]</sup>. Such patients are overly concerned about repeating PCI, including the surgical risks and complications, which significantly increase psychological pressure, and are prone to

developing depression in the long run.

In addition, preoperative depression is also an important influencing factor. 4% of patients exhibited depressive symptoms before surgery, and 3.4% of preoperative depression symptoms developed into postoperative depression <sup>[36]</sup>. Other factors include multiple comorbidities, low medication compliance, poor self-efficacy, and lack of peer support, etc.

## **4. Assessment tools**

### **4.1. Universal scale**

#### **4.1.1. Zung's Self-Rating Depression Scale (SDS)**

The Self-rating depression scale (SDS) was compiled by Zung <sup>[37]</sup> in 1965. It consisted of 20 items, including 4 factors: psycho-affective symptoms, somatic disorders, psychomotor disorders, and depressive psychological disorders. This scale adopts a 4-level rating method, mainly used to assess the severity of the existing depressive state and changes in the patient's psychological state during treatment <sup>[38]</sup>. Chinese scholars applied SDS to 316 inpatients, using the American "Diagnostic and Statistical Manual of Mental Disorders, 4th Edition" Scheduling Clinical Examination of Axis I Disorders (SCID) as the gold standard to determine the screening effectiveness of SDS for depressive disorders <sup>[39]</sup>. The results showed that SDS's overall diagnostic compliance rate was 87.34%, which indicated an excellent diagnostic performance.

#### **4.1.2. Somatization Symptoms Self-Rating Scale (SSS)**

The Somatization symptom self-rating scale (SSS) <sup>[40,41]</sup> has 20 questions, which were answered by the patients themselves. Among them, there are 9 questions about somatization symptoms, 5 questions about anxiety, 4 items about depression, and 2 items about both anxiety and depression. It was graded from 1–4 points, and the positive critical value was generally 36/37. SSS focuses on anxiety, depression, and other emotional disorders caused by disease symptoms. It is more accurate in assessing the impact of disease severity on patients' mental state and exhibits good sensitivity and specificity for assessing both outpatients and inpatients in general hospitals <sup>[42]</sup>.

#### **4.1.3. Hamilton Depression Rating Scale (HAM-D)**

The Hamilton Depression Rating Scale (HAM-D) was compiled by Professor Hamilton in 1960 <sup>[43]</sup>. It is the most commonly used scale for assessing depression in clinical practice. This measurement method has high professional requirements and requires two psychologically trained personnel for assessment. There are few evaluations of the reliability and validity of HAM-D in China. One study evaluated the HAM-D-6 version and showed that the test-retest reliability was 0.95, and had good internal consistency <sup>[44]</sup>.

#### **4.1.4. Hospital Anxiety and Depression Scale (HADS)**

The Hospital Anxiety and Depression Scale (HADS) was compiled by Zigmond and Snaith in 1983 <sup>[45]</sup>. It is used for anxiety and depression screening in medical and surgical patients without any primary mental illness. It consists of 14 items, 7 used to assess anxiety and 7 for depression <sup>[46]</sup>. Some researchers compared the detection rates between HADS and SDS <sup>[38]</sup>. Among 615 cardiovascular disease patients, the detection rate of HADS was 37.4%, which was higher than the detection rate of SDS at 36.1%. HADS can better reflect the depression status of inpatients with cardiovascular disease.

#### **4.1.5. Beck Depression Inventory-II (BDI-II)**

The Beck Depression Inventory-II (BDI-II) is a self-rating depression scale revised by American psychologist

Beck in 1996. There are 21 items in total, mainly including two factors: the somatization-affective factor and the cognitive factor. BDI uses the Linker 4-level scoring method. The higher the BDI score, the greater the severity of the depressive symptoms. Cronbach's alpha coefficient was about 0.9 [47]. The existing evidence suggested that the BDI-II could be utilized for screening possible cases of patients with major depression within two weeks, enabling significant diagnostic accuracy, and is expressed as the area under the receiver operating characteristic (ROC) curve of approximately 75% or more.

#### **4.1.6. Geriatric Depression Scale (GDS-30)**

The Geriatric Depression Scale (GDS-30) [48] was developed and validated by Yesavage et al. [49] in 1982. It is used to screen for depression in older people at home and abroad. It consists of 30 items, mainly including the following 6 symptoms: depression, reduced activity, irritability, withdrawal, painful thoughts, and negative evaluation of the past, present, and future. Subjects will answer with "yes" or "no," where a score of 0–10 is considered normal, and a score of 1:1 indicates depressive symptoms. The higher the score, the greater the degree of depression. Cronbach's alpha coefficient of GDS-30 is > 0.85. GDS is mainly suitable for individuals aged 5–6 years old and above. It can detect the unique physical symptoms of elderly patients with depression and can distinguish them from normal physical discomfort symptoms with high sensitivity.

#### **4.2. Specificity scale**

The Chinese version of the Coronary Heart Disease Patient Depression Scale (C-CDS), the Heart Disease Depression Scale, is a self-reported cardiac depression scale compiled and applied by Hare [50] in 1996. It has 26 items, 2 dimensions, and uses the linker 7-level scoring method. The Cronbach's alpha coefficient was 0.90. Some studies have pointed out that using a cut-off score of  $\geq 85$  points increased the screening sensitivity to 97% [51].

### **5. Nursing interventions**

#### **5.1. Exercise therapy**

Exercise therapy can improve depression by regulating neuroplasticity and reducing the body's oxidative stress and inflammatory response [52]. It has been proven effective in reducing depressive symptoms and the incidence of cardiac events, as well as reducing the incidence and mortality risk in CHD patients [53]. Commonly used therapies mainly include traditional sports therapy and modern sports therapy.

Traditional exercises include Wu Qin Xi, Baduan Jin, Tai Chi, etc. Li [54] conducted a 6-month "Wu Qin Micro Exercise," combining Wu Qin Xi with aerobic exercise to provide personalized exercise plans to post-PCI patients with different cardiac function statuses. Exercise prescriptions were adjusted to perform limb exercises and improve the patient's mood. Sun [14] used the Case Health Questionnaire (PHQ-9) and found that exercise has an effective rate of 76.47% in reducing depressive symptoms.

Modern exercise methods include Peng's [55] "seven-day lower limb passive exercise," Luo's [56] "seven-step method," Wang's [57] 12-week exercise intervention, cardiac rehabilitation exercise, and yoga exercise program, etc. These therapies have all confirmed the effectiveness of exercise in improving post-PCI depression and also improves cardiopulmonary function. However, the type of exercise depends on the patient's specific condition and status. In addition, the exercise needs to be done according to one's capabilities and moderately.

#### **5.2. Psychotherapy**

Psychotherapy refers to sports psychology methods that train, educate, and treat patients through verbal or non-verbal factors to reduce and eliminate physical symptoms and improve their psychological and mental state.

Commonly used psychological therapies include cognitive therapy, music therapy, mindfulness-based stress reduction therapy, etc.

Cognitive therapy is a new type of psychological therapy that alters automatic negative cognitive thinking and establishes correct cognition by enlightening and exposing the patients' bad and erroneous cognitions<sup>[58]</sup>. Currently, group cognitive therapy is commonly used in China. As compared to individual cognitive behavioral therapy or online self-help psychotherapy, group cognitive therapy has higher efficiency, lower dropout rate, and increases patients' symptom recognition<sup>[58]</sup>. Incorrect cognition is corrected through peer support and joint participation, allowing for more accurate knowledge of the disease to be acquired. Some researchers combined cognitive behavioral theory with cardiology knowledge to help patients better understand their diseases and correct their cognitive errors, promoting prognosis and improving patients' quality of life<sup>[59]</sup>.

Music therapy is a new non-pharmacological treatment used within individuals or groups medically, educationally, and in daily life. Music therapy aims to promote the physical and mental health of participants<sup>[60]</sup>. Dai<sup>[61]</sup> applied music therapy during the intervention of pain and depression in patients after coronary artery transplantation. The results showed that 30 minutes of music therapy after surgery reduced the pre-intervention SDS score ( $58.6 \pm 10.4$ ) to the intervention level ( $46.3 \pm 9.3$ ), while the SDS scores of the two groups that did not use music therapy remained unchanged. Geng<sup>[62]</sup> showed that by choosing different music styles according to the patient's different emotional states, the effect of music therapy was maximized.

Mindfulness-based stress reduction therapy (MBSR) is based on mindfulness meditation as the core to achieve self-regulation through mental training and reduce the occurrence of depression or anxiety<sup>[63]</sup>. The general treatment course of MBSR is 8 weeks and can be performed via electronic devices. Li<sup>[64]</sup> showed that MBSR was able to improve patients' negative emotions after CHD PCI surgery and effectively improved psychological flexibility. Lundgren et al.<sup>[65]</sup> showed that MBSR was a feasible treatment for a subgroup of CHD patients who experienced persistent depression after a coronary event.

### 5.3. TCM nursing

Traditional Chinese medicine (TCM) nursing refers to nursing work under the guidance of TCM's fundamental theories and techniques. It relies on TCM technology to regulate the function of organs from the root, dredge the meridians, nourish the heart and calm the mind, improve blood oxygen metabolism in the brain, and control depressive symptoms. Wang et al.<sup>[66]</sup> used acupoint massage combined with five-tone therapy in patients with qi deficiency and blood stasis after PCI. The results showed that the above method alleviated the condition and effectively improved the patient's depression status. Besides that, auricular acupoint sticking is also a commonly used TCM care method. Auricular acupoint sticking therapy refers to affixing *Auricularia vulgaris* seeds to acupuncture points on the auricle, which promotes the body's self-repair mechanism through soothing of the ears, meridians, nerves, and brain, to improve symptoms of anxiety and depression<sup>[67,68]</sup>.

### 5.4. Other nursing interventions

Wu<sup>[69]</sup> provided continuous care for post-PCI patients for 6 months, which significantly improved the patient's treatment and medication compliance, and reduced negative emotions. Some studies also encouraged the combination of nursing models during the nursing intervention to improve the patient's mood and quality of life. In addition, these models reduced depressive symptoms and improved prognosis through increasing nurse participation and peer support<sup>[70,71]</sup>.

## 6. Conclusion

Not only does post-PCI depression harm the patient's mental health, but it also adversely affects the patient's prognosis and quality of life. The occurrence of depression in post-PCI patients has attracted widespread attention. Medical staff ought to prevent, detect, perform early intervention, and understand the specific health needs of post-PCI patients, to provide them with personalized nursing interventions. Currently, there exists a variety of nursing intervention methods for the care of post-PCI depressed patients. However, there are no systematic nursing interventions tailored towards the psychosocial problems of patients undergoing PCI. Based on the above literature, there are still several aspects that need to be strengthened to reduce the occurrence of post-PCI depression: (1) Increase pre-PCI screening and nursing intervention. Effective preoperative screening and management may prevent the occurrence of postoperative psychological disorders. In regards to cardiovascular adverse events and the Seattle angina score after PCI, preoperative depression can be an indicator for postoperative disease prognosis, so it is essential to manage the patient's mental state before surgery. (2) Patient emotional screening should be conducted promptly after PCI. (3) Patients should be encouraged to prioritize self-care during recovery and comply with home rehabilitation to improve their overall quality of life. The long-term self-management status of CHD patients after PCI is moderate or poor. Medical staff should provide more guidance regarding smoking cessation, first aid training, and the use of electronic devices to improve medication compliance, etc. to improve patients' self-care abilities and quality of life. In future studies, researchers should construct a nursing intervention model that can comprehensively and systematically solve the adverse psychological problems of post-PCI patients.

## Funding

Xianyang City Key R&D Plan Project (No.: L 2022ZDYFSF004)

## Disclosure statement

The authors declare no conflict of interest.

## References

- [1] National Health Commission, 2021, China Health Statistics Yearbook, China Union Medical University Press, Beijing.
- [2] Gao G, Zhou L, Zhang D, et al., 2019, Study on the Predictive Value of ACEF Score in Chinese Patients Undergoing Percutaneous Coronary Intervention. *Chinese Journal of Circulation*, 34(11): 1047–1054.
- [3] Zhang J, Cui Y, Lu X, et al., 2021, Research on the Correlation Between Mental Health Status and Patients' Social Support after PCI. *Nursing*, 10(2): 71–77.
- [4] Meng R, Yu C, Liu N, et al., 2020, Association of Depression with All-Cause and Cardiovascular Disease Mortality Among Adults in China. *JAMA Netw Open*, 3(2): e1921043.
- [5] van Dijk MR, Utens EM, Dulfer K, et al. 2016, Depression and Anxiety Symptoms as Predictors of Mortality in PCI Patients at 10 Years of Follow-Up. *Eur J Prev Cardiol*, 23(5): 552–558.
- [6] Stanicki P, Szarpak J, Wieteska M, et al., 2020, Postoperative Depression in Patients after Coronary Artery Bypass Grafting (CABG) - A Review of the Literature. *Pol Przegl Chir*, 92(5): 1–5.
- [7] Rawashdeh SI, Ibdah R, Kheirallah KA, et al., 2021, Prevalence Estimates, Severity, and Risk Factors of Depressive Symptoms Among Coronary Artery Disease Patients after Ten Days of Percutaneous Coronary Intervention. *Clin*

Pract Epidemiol Ment Health, 17: 103–113.

- [8] Kim HS, Kim HK, Kang KO, et al., 2019, Determinants of Health-Related Quality of Life Among Outpatients with Acute Coronary Artery Disease after Percutaneous Coronary Intervention. *Jpn J Nurs Sci*, 16(1): 3–16.
- [9] Aguayo E, Lyons R, Juo YY, et al., 2019, Impact of New-Onset Postoperative Depression on Readmission Outcomes after Surgical Coronary Revascularization. *J Surg Res*, 233: 50–56.
- [10] Damen NL, Pelle AJ, van Geuns RJ, et al., 2011, Intra-Individual Changes in Anxiety and Depression During 12-Month Follow-Up in Percutaneous Coronary Intervention Patients. *J Affect Disord*, 134(1–3): 464–467.
- [11] Montesano M, Reed JL, Tulloch HE, et al., 2020, Cardiac Rehabilitation is Associated with More Significant Improvements in Psychological Health Following Coronary Artery Bypass Graft Surgery when compared with Percutaneous Coronary Intervention. *Appl Physiol Nutr Metab*, 45 (12): 1339–1344.
- [12] Gu G, Zhou Y, Zhang Y, et al., 2016, Increased Prevalence of Anxiety and Depression Symptoms in Patients with Coronary Artery Disease Before and After Percutaneous Coronary Intervention Treatment. *BMC Psychiatry*, 16: 259.
- [13] Liu X, Ding B, Zhang Y. Correlation Between Anxiety, Depression, Sleep Quality and Quality of Life In Elderly Patients Treated with Percutaneous Coronary Intervention. *Journal of Shanghai Jiao Tong University: Medical Edition*, 2018, 38(9): 1085–1091.
- [14] Sun X, Zhang J, Wang L, et al., 2020, Effects of Baduanjin Combined with Aerobic Treadmill on Anxiety, Depression, and Cardiopulmonary Function in Patients after PCI. *China Sports Science and Technology*, 56(5): 41–47.
- [15] Lu J, Yang N, Zhang M, et al., 2021, Investigation of the Current Situation and Influencing Factors of Depression in Patients with Coronary Heart Disease after PCI. *International Journal of Psychiatry*, 48(4): 687–689.
- [16] Yang XL, Xie WY, Cai YM, et al., 2022, Investigation of the Negative Emotions Exhibited in Patients with Coronary Heart Disease After PCI and any Influencing Factors. *Psychol Res Behav Manag*, 15: 3027–3037.
- [17] Liu X, Fowokan A, Grace SL, et al., 2021, Chinese Patients’ Clinical and Psychosocial Outcomes in the Six Months Following Percutaneous Coronary Intervention. *BMC Cardiovasc Disord*, 21(1): 148.
- [18] Wang M, Li S, Song T, 2021, Research Progress on the Comorbidity Mechanism of Depression and Cardiovascular Disease. *Chinese General Medicine*, 24(11): 1426–1430 + 1440.
- [19] Xi G, Zhang W, 2011, Research Progress on the Mechanisms of Depression. *Journal of Shaanxi Normal University (Natural Science Edition)*, 39(6): 64–71.
- [20] Edward KL, Stephenson J, Giandinoto JA, et al., 2016, An Australian Longitudinal Pilot Study Examining Health Determinants of Cardiac Outcomes 12 Months Post Percutaneous Coronary Intervention. *BMC Cardiovasc Disord*, 16: 31.
- [21] Koh Y, Stehli J, Martin C, et al., 2019, Does Sex Predict the Quality of Life After Acute Coronary Syndromes: An Australian, State-Wide, Multicentre Prospective Cohort Study. *BMJ Open*, 9(12): e34034.
- [22] Li X, Liu H, 2019, Analysis of Current Status and Influencing Factors of Anxiety and Depression in Elderly Patients with Hypertension and Prediabetes. *Chinese Journal of Health Care Medicine*, 21(4): 377–379.
- [23] Yang C, Jin X, Li Q, et al., 2022, Analysis of Risk Factors for Postoperative Depression in Patients Undergoing Percutaneous Coronary Intervention. *General Nursing*, 20(9): 1288–1291.
- [24] Guo H, He H, Dai S, et al., 2014, Investigation on Depression and Related Factors in Patients with Coronary Heart Disease after PCI. *Chinese Journal of Modern Nursing*, 20(20): 2492–2494.
- [25] Lu C, 2021, Self-Efficacy and its Influencing Factors in Patients with Acute Myocardial Infarction after Percutaneous Coronary Intervention. *Henan Medical Research*, 30(31): 5832–5835.
- [26] Xu N, Gao Z, 2022, The Mediating Role of Coping Style in Patients with Coronary Heart Disease Between Type D Personality and Negative Emotions. *Nursing Research*, 36(15): 2760–2764.



- [27] Enatescu VR, Cozma D, Tint D, et al., 2021, The Relationship Between Type D Personality and the Complexity of Coronary Artery Disease. *Neuropsychiatr Dis Treat*, 17: 809–820.
- [28] Lu Y, Ji J, Zhang A, 2021, Research Progress on Psychological and Behavioral Coping Styles of Patients with Type D Personality Coronary Heart Disease. *Nursing Research*, 35(20): 3669–3672.
- [29] Zhou H, Zou X, Liu L, et al., 2019, Analysis of Anxiety and Depression Status and Influencing Factors in Patients with Coronary Heart Disease after Percutaneous Coronary Intervention. *Journal of Cardiopulmonary and Vascular Diseases*, 38(4): 356–359 + 369.
- [30] Yamaguchi D, Izawa A, Matsunaga Y, 2020, The Association of Depression with Type D Personality and Coping Strategies in Patients with Coronary Artery Disease. *Intern Med*, 59(13): 1589–1595.
- [31] Li M, Fu Y, Wu Ma, et al., 2017, Research on the Correlation Between the Ability of Daily Living Activities and Depression in Older People. *Modern Preventive Medicine*, 44(21): 3957–3961.
- [32] Song X, Peng Y, An L, et al., 2022, Analysis of the Current Situation and Influencing Factors of Exercise Fear in Patients with Coronary Heart Disease. *General Nursing*, 2022, 20(1): 94–97.
- [33] Li Y, Zhou L, Li L, et al., 2021, Analysis of Rehabilitation Exercise Conditions and Influencing Factors of Patients with Coronary Heart Disease after Discharge. *Journal of Nursing*, 36(14): 88–91.
- [34] Li Q, Liu S, Huang H, et al., 2018, The Impact of Adverse Psychological Status in Patients with Acute Coronary Syndrome on Clinical Cardiac Function Classification. *Journal of Nursing Education*, 33(24): 2255–2258.
- [35] Cao Q, Weng C, Gao C, 2021, Analysis of Influencing Factors of Depression in Patients after Percutaneous Coronary Intervention. *Journal of Ningxia Medical University*, 43(11): 1120–1124.
- [36] Falk A, Kählin J, Nymark C, et al., 2022, Depression is Associated with Delirium after Cardiac Surgery in a Population-Based Cohort Study. *Interact Cardiovasc Thorac Surg*, 35(2).
- [37] Zung WW, 1965, A Self-Rating Depression Scale. *Arch Gen Psychiatry*, 12: 63–70.
- [38] Sun Z, Liu H, Jiao L, et al., 2016, Study on the Consistency of Two Self-Rating Depression Scales in the Assessment of Depressive Symptoms in Patients with Cardiovascular Disease. *Chinese Journal of Clinicians (Electronic Edition)*, 2016(23): 3535–3537.
- [39] Wang R, Liu L, Cui K, et al., 2009, Feasibility Study of the ZUNG Self-Rating Depression Scale as a Screening Tool for Depression in Medical Inpatients. *Chinese Journal of Health Psychology*, 17(8): 923–925.
- [40] Li H, Yu X, Tian Y, et al., 2020, Research on Two Measurement Methods of Anxiety and Depression in Patients Before Cardiac Interventional Surgery. *Chinese Cardiovascular Research*, 18(10): 906–909.
- [41] Zhuang Q, Mao J, Li C, et al., 2010, Preliminary Preparation, Reliability, and Validity Study of the Somatization Symptom Self-Rating Scale. *Chinese Journal of Behavioral Medicine and Brain Science*, 19(9): 847–849.
- [42] Fu Y, Lin Q, Xiang Q, et al., 2023, Comparison Of SSS-CN and PHQ-15 in Evaluating Patients with Suspected Psychological Disorders in Cardiovascular Medicine. *Front Psychol*, 14: e1027253.
- [43] Bech P, Allerup P, Gram LF, et al., 1981, The Hamilton depression scale. Evaluation of Objectivity using Logistic Models. *Acta Psychiatr Scand*, 63(3): 290–299.
- [44] Sun X, Li Y, Yu C, et al., 2017, A Systematic Review of Studies on the Reliability and Validity of the Chinese Version of the Depression Scale. *Chinese Journal of Epidemiology*, 38(1): 110–116.
- [45] Zigmund AS, Snaith RP, 1983, The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand*, 67(6): 361–370.
- [46] Sun Z, Liu H, Jiao L, et al., 2017, Study on the Reliability and Validity of the Hospital Anxiety and Depression Scale. *Chinese Journal of Clinicians (Electronic Edition)*, 11(2): 198–201.
- [47] Wang YP, Gorenstein C, 2013, Psychometric Properties of the Beck Depression Inventory-II: A Comprehensive Review. *Braz J Psychiatry*, 35(4): 416–431.
- [48] Pinho MX, Custodio O, Makdisse M, et al., 2010, Reliability and Validity of the Geriatric Depression Scale in

Elderly Individuals with Coronary Artery Disease. *Arquivos Brasileiros De Cardiologia*, 94(5): 570–579.

- [49] Yesavage JA, Brink TL, Rose TL, et al., 1982, Development and Validation of a Geriatric Depression Screening Scale: A Preliminary Report. *J Psychiatr Res*, 17(1): 37–49.
- [50] Hare DL, Davis CR, 1996, Cardiac Depression Scale: Validation of a New Depression Scale for Cardiac Patients. *Journal of Psychosomatic Research*, 40(4): 379–386.
- [51] Liang S, Li X, 2011, Evaluation of Commonly Used Scales for Coronary Heart Disease Combined with Depression and Anxiety Disorders. *Chinese Journal of Practical Internal Medicine*, 31(2): 135–138.
- [52] Liu W, Qi Z, Liu W, 2013, Research Progress on Critical Genes of Depression and Exercise Intervention Mechanisms from the Perspective of Bioinformatics. *China Sports Science and Technology*, 59(3): 37–43.
- [53] Rutledge T, Redwine LS, Linke SE, et al., 2013, A Meta-Analysis of Mental Health Treatments and Cardiac Rehabilitation for Improving Clinical Outcomes and Depression among Patients with Coronary Heart Disease. *Psychosom Med*, 75(4): 335–349.
- [54] Feng L, Chen Z, Luo F, 2021, The “Five-Animal Micro-Exercise” Application Effect on Cardiac Rehabilitation in Patients after Percutaneous Coronary Intervention. *Chinese Journal of Interventional Cardiology*, 29(9): 509–514.
- [55] Peng Y, Tu H, Xiong X, et al., 2022, Application of Passive Movement of Lower Limbs in Early Rehabilitation after PCI in Patients with Acute Myocardial Infarction. *Nursing Research*, 36(6): 1083–1086.
- [56] Luo J, 2021, Effect of the Seven-Step Method on Depression and Anxiety after PCI in Young and Middle-Aged Male Patients with Acute Myocardial Infarction. *Chinese and Foreign Medical Research*, 19(27): 86–88.
- [57] Wang C, Liu S, Zhao L, et al., 2023, Effects of Exercise Therapy Combined with Enhanced External Counterpulsation on Cardiac Function and Quality of Life in Patients with Coronary Heart Disease. *Shandong Medicine*, 63(4): 17–21.
- [58] Chang L, Ding F, Lu W, et al., 2020, Exploring the Effectiveness and Feasibility of Online Structured Group Cognitive Behavioral Therapy for Patients with Mild Depression. *Chinese Journal of Psychiatry*, 53(1): 35–41.
- [59] Lu J, Zhang X, Ou S, et al., 2016, Influence of Cognitive Behavioral Therapy on Mood and Quality of Life after Stent Implantation in Young and Middle-Aged Patients with Coronary Heart Disease. *Int Heart J*, 57(2): 167–172.
- [60] Roddis JK, Tanner M, 2020, Music Therapy for Depression. *Res Nurs Health*, 2020, 43(1): 134–136.
- [61] Dai WS, Huang ST, Xu N, et al., 2020, The Effect of Music Therapy on Pain, Anxiety, and Depression in Patients after Coronary Artery Bypass Grafting. *J Cardiothorac Surg*, 15(1): 81.
- [62] Geng L, 2011, Effects of Music Therapy on Hemodynamics and Emotions in Elderly Patients with Coronary Heart Disease after Interventional Treatment. *Chinese Journal of Gerontology*, 31(21): 4141–4142.
- [63] Wei M, Huang L, Zhang L, et al., 2022, Effects of Mindfulness-Based Stress Reduction Therapy on the Psychological State of Patients with Coronary Heart Disease after PCI. *Journal of Cardiovascular Rehabilitation Medicine*, 31(4): 489–493.
- [64] Li Z, Liu Y, Zheng Y, 2023, Application of Mindfulness-Based Stress Reduction Therapy in Patients with Coronary Heart Disease After PCI. *Nursing Research*, 37(6): 1103–1106.
- [65] Lundgren O, Garvin P, Nilsson L, et al., 2022, Mindfulness-Based Stress Reduction for Coronary Artery Disease Patients: Potential Improvements in Mastery and Depressive Symptoms. *J Clin Psychol Med Settings*, 29(3): 489–497.
- [66] Wang X, Wang Q, Long J, et al., 2022, Effect of Acupoint Massage Combined with Five-Tone Therapy on Anxiety and Depression in Patients with Qi Deficiency and Blood Stasis Syndrome after Percutaneous Coronary Intervention for Coronary Heart Disease. *Guangxi Medicine*, 44(1): 117–120.
- [67] Guo X, Liu Ya, Zhai Y, 2022, Clinical Efficacy of Auricular Point Sticking Combined with Enhanced External Counterpulsation and Xinkeshu Tablets in the Treatment of Qi Stagnation and Blood Stasis Type Coronary Heart Disease Accompanied by Anxiety and Depression and its Impact on Patient’s Psychological State and Inflammatory

Factors. *Hebei Traditional Chinese Medicine*, 44(9): 1530–1534.

- [68] Zhao X, Shen C, Wang Z, et al., 2018, Effects of Transcutaneous Electrical Nerve Stimulation Combined with Auricular Point Sticking on Depression and Self-Esteem in Elderly Patients with Coronary Heart Disease. *Shanghai Journal of Acupuncture*, 37(3): 282–285.
- [69] Wu X, 2020, Application of Continuous Nursing in Caring for Patients with Coronary Heart Disease after Coronary Intervention. *Nursing Research*, 34(10): 1854–1856.
- [70] Kyaw TTE, Nagel J, Bosbach A, et al., 2021, Telephone-Based Peer Support Intervention to Reduce Depressive Symptoms in Women with Coronary Heart Disease, A Randomized Controlled Trial in Germany. *Women Health*, 61(7): 619–632.
- [71] Coronas-Watkins KM, Theobald KA, White K M, 2019, Outcomes of a Randomized Pilot Trial of a Nurse-Led Clinic for Patients after Percutaneous Coronary Intervention. *Aust Crit Care*, 32(4): 285–292.

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