

*Review Article***Effect of acupressure on the anxiety and pain of patients undergoing cardiac catheterization: A systematic review**Tara Alizadeh ^a  | Poorya Takasi ^{a*} ^a Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran

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Email: pooryapin380@gmail.com<https://doi.org/10.32598/JNRC.P.2401.1010>This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial 4.0 License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0).

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Abstract

The objective of this systematic review was to examine the influence of acupressure on the levels of anxiety and pain among individuals undergoing cardiac catheterization. An extensive search was carried out across global electronic databases, encompassing Scopus, PubMed, and Web of Science, along with Iranian databases like Iranmedex, spanning from the earliest available date to October 1, 2023. The search utilized keywords derived from Medical Subject Headings, encompassing terms like "acupressure", "anxiety", "pain", and "cardiac catheterization". The quality evaluation of randomized controlled trials and quasi-experimental studies was performed utilizing the critical assessment checklist from the Joanna Briggs Institute. A total of 781 patients participated in nine studies, with 59.60% being female, and 57.11% assigned to the intervention group. The participants had a mean age of 55.72 years (SD=9.13), and the average duration of the intervention was 12.78 minutes. The findings of this systematic review suggest that health professionals, including nurses, can effectively utilize acupressure to mitigate both pain and anxiety in patients undergoing cardiac catheterization. As a recommendation, it is advised that healthcare managers and policymakers create supportive environments within hospitals, enabling healthcare professionals to incorporate acupressure techniques. This proactive approach may contribute to the reduction of anxiety and pain experienced by patients undergoing cardiac catheterization.

Keywords: Acupressure, Anxiety, Pain, Cardiac, Catheterization, Systematic Review.**1 | Introduction**

Cardiovascular diseases stand as a leading cause of global mortality, with a significant surge observed in developing nations. The escalating prevalence of this ailment has prompted the adoption of non-pharmacological interventions in numerous patients. These approaches encompass percutaneous coronary intervention, the administration of contrast agents, and coronary artery fluoroscopy [1, 2]. Following cardiac catheterization, complications such as bleeding, hematoma, embolism, and arterial thrombosis may arise [3]. Conversely, the uptick in coronary artery disease has led to a rise in procedures like angiography and angioplasty [4].

In addition to the aforementioned complications associated with cardiac catheterizations, patients often grapple with

psychological issues arising from a lack of awareness about potential medical complications. These psychological challenges encompass stress, anxiety, and occasional emotional shock [5]. The resulting anxiety can trigger physiological changes, such as an elevated heart rate and blood pressure. When coupled with cardiac catheterization, these changes may lead to complications like dysrhythmias, spasms, or blood vessel rupture [6].

Moreover, procedures like angiography and angioplasty contribute to various forms of patient discomfort, including pain during sheath removal and back pain resulting from extended periods of bed rest with limited movement [7, 8]. The use of drugs to alleviate pain and anxiety has its own set of side effects, prompting an increased reliance on non-pharmacological approaches. These methods offer advantages such as cost-effectiveness, simplicity, effectiveness, and non-invasiveness [9].

Among the non-pharmacological methods to alleviate anxiety and pain, options like cognitive therapy, massage therapy, meditation, acupressure, and aromatherapy have gained prominence. Acupressure, in particular, stands out as a self-administered technique without the need for external assistance [10, 11]. Specific acupressure points, including Shenmen, Hegu, and the third eye, have been identified as effective in reducing both pain and anxiety [12, 13]. Research conducted in Iran demonstrated the effectiveness of acupressure in controlling pain during arterial sheath removal in patients undergoing angioplasty [14]. Another study from Iran reported that simultaneous pressure on the Shenmen points of the ear and the third eye can be beneficial in reducing pre-angiography anxiety in patients [5].

While various studies have examined the impact of acupressure on anxiety and pain in individuals undergoing cardiac catheterization, there is currently no published comprehensive review that synthesizes and summarizes these articles. Given the significance of this topic and the existing conflicting findings regarding the influence of acupressure on patient anxiety and pain, this systematic review was undertaken. The objective was to investigate and compile evidence on the effect of acupressure specifically on anxiety and pain experienced by patients undergoing cardiac catheterization.

2 | Methods

2.1 | Study registration and reporting

The procedures of this systematic review followed the guidelines established in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist, serving as the fundamental framework [15]. It is important to highlight that the systematic review under consideration has not been registered in the International Prospective Register of Systematic Reviews (PROSPERO) database.

2.2 | Search strategy

A systematic exploration of international electronic databases, including Scopus, PubMed, and Web of Science, was undertaken from the earliest available date until October 1, 2023. The search incorporated keywords derived from Medical Subject Headings such as "acupressure", "anxiety", "pain", and "cardiac catheterization". For instance, the search strategy employed in the PubMed/MEDLINE database encompassed terms such as (("Impact") OR ("Effect") OR ("Improve") OR ("Encourage") OR ("Promote") OR ("Advocate") OR ("Overcome") OR ("Address") OR ("Influence") OR ("Optimize") OR ("Decrease") OR ("Intervention")) AND (("Acupressure") OR

("Auriculotherapy") OR ("yintang") OR ("shenmen") OR ("Ear acupressure")) AND (("Pain") OR ("Back pain")) AND "Anxiety" AND (("Cardiac Catheterization") OR ("Coronary angiography") OR ("angiography") OR ("Angioplasty")). Boolean operators "OR" and "AND" were utilized to combine terms. The Persian electronic databases were also searched using the Persian equivalents of the mentioned keywords. The systematic search process was independently carried out by two researchers. It is crucial to emphasize that this review does not include gray literature, which comprises expert comments, conference presentations, dissertations, research and committee reports, and ongoing research. Gray literature encompasses electronically published articles that have not undergone review by a for-profit publisher [16].

2.3 | Inclusion and exclusion criteria

In this systematic review, interventional studies conducted in both English and Persian languages were included, focusing specifically on assessing the impact of acupressure on anxiety and pain in patients undergoing cardiac catheterization. The review excluded reviews, case reports, conference proceedings, letters to the editor, and qualitative studies from consideration.

2.4 | Study selection

The articles identified during the search process underwent assessment using EndNote 20 software. Two researchers independently examined the papers according to the inclusion and exclusion criteria specified for this study. After the initial electronic review, which involved eliminating duplicate studies, the titles, abstracts, and full texts of the articles were manually scrutinized. In instances of disagreement between the first two researchers, a third researcher was involved to facilitate resolution. Ultimately, a meticulous examination of the sources was conducted to ensure comprehensive coverage and prevent any loss of information.

2.5 | Data extraction and quality assessment

Within this systematic review, the chosen publications underwent analysis to extract data on diverse parameters. These parameters encompassed the first author's name, publication year, location, study design, sample size, type of intervention, study duration, intervention duration, follow-up duration, participant age, gender distribution, characteristics of the control group, tool specifications, specific statistical tests employed, and key findings. The Joanna Briggs Institute (JBI) critical evaluation checklist [17] was utilized to evaluate the quality of randomized control trials (RCTs) and quasi-experimental research [17]. This

checklist evaluates 13 and 9 items related to internal validity, participant comparability, measurement accuracy, and appropriateness of statistical analysis in RCTs and quasi-experimental trials, respectively. In the systematic review, two researchers independently assessed the quality of each study using a three-point scoring system: "yes" (score 1), "no" (score 0), and "not applicable/not clear" (score 0) [18]. The quality assessment ratings, determined by the JBI checklists, classified the studies as either good (≥ 8), fair (6-7), or poor (≤ 5) [17].

3 | Results

3.1 | Study selection

As illustrated in Figure 1, an extensive search across electronic databases initially identified 2,075 studies. After eliminating duplicates, 1,790 articles were retained. A thorough examination of article titles and abstracts resulted in the exclusion of 1,619 studies that did not align with the objectives of the present review. Subsequently, 116 studies were excluded due to a lack of an experimental design. A detailed examination of the full texts of fifty-two studies revealed that thirty-one studies were deemed inadequate in terms of design and findings, while twelve studies lacked essential data. Ultimately, nine studies [5, 14, 19-25] met the inclusion criteria and were included in this systematic review.

3.2 | Study characteristics

As outlined in Table 1, a total of 781 participants were included across the nine studies [5, 14, 19-25]. Among the participants, 59.06% were male, and 57.11% were assigned to the intervention group. The average age of the participants was 55.72 years ($SD=9.13$). All studies (5, 14, 19-25) were randomized controlled trials (RCTs), with eight studies [5, 14, 19, 21-25] conducted in Iran and one study [20] conducted in Turkey. Nine studies (5, 14, 19-25) incorporated a control group, and one study [14] included a follow-up component. Regarding measurement tools, four studies [5, 19, 20, 23] employed the Spielberger Trait State Anxiety Inventory, three studies [14, 24, 25] utilized the Visual Analog Scale for pain, one study [21] used the Visual Analog Scale for anxiety, and one study [22] employed the Depression, Anxiety, and Stress Scale.

3.3 | Methodological quality assessment of eligible studies

As illustrated in Figure 2, all nine studies [5, 14, 19-25] achieved a high level of quality.

3.4 | Effect of acupuncture on the anxiety and pain of patients undergoing cardiac catheterization

The mean duration of the intervention across all studies [5, 14, 19-25] was 12.78 minutes. In every study, acupuncture demonstrated effectiveness in alleviating both pain and anxiety.

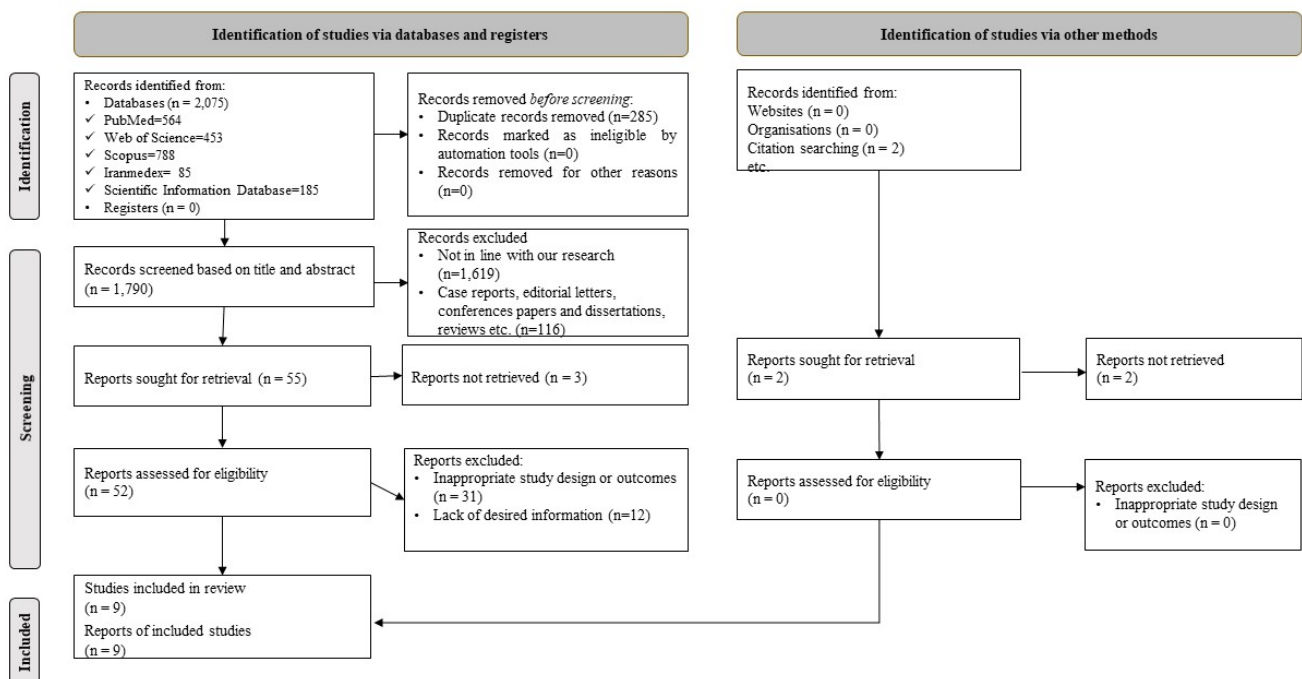


Figure 1. Flow diagram of the study selection process.

4 | Discussion

The objective of this systematic review was to assess the impact of acupressure on the anxiety and pain experienced by individuals undergoing cardiac catheterization. Consequently, the findings of this review indicate that acupressure contributes to a reduction in both pain and anxiety levels.

Coronary artery disease stands as a global cause of mortality, claiming numerous lives annually [26]. Cardiac catheterization, employed for diagnosing coronary artery disease and even eliminating blood clots, is not without its complications, encompassing both physical and psychological aspects. [27]. Psychological complications, often stemming from a lack of awareness, may manifest as stress and anxiety [28]. Additionally, cardiac catheterization can induce pain in patients, whether during the sheath removal or due to prolonged bed rest without movement [29]. To mitigate these complications, alongside conventional approaches, alternative methods like acupressure can be considered. This systematic review highlights that the application of acupressure has demonstrated efficacy in reducing both anxiety and

pain levels in individuals undergoing cardiac catheterization [5, 14, 19-25].

The outcomes of this systematic review indicate the effectiveness of acupressure in alleviating back pain and anxiety among patients undergoing cardiac catheterization. A study conducted in Iran supported this, revealing the effectiveness of acupressure in reducing back pain and advocating for its use as a cost-effective non-pharmacological treatment for pain reduction [30]. Similarly, research in Turkey demonstrated the efficacy of acupressure in reducing post-heart surgery anxiety levels [31]. These findings collectively suggest that acupressure holds promise in addressing back pain and anxiety stemming from various health conditions, offering a means to mitigate these complications. Given these positive results, it is recommended that healthcare managers and policymakers create conducive environments for healthcare professionals, including nurses, to incorporate acupressure into hospital settings. This proactive measure could contribute to the reduction of anxiety and pain experienced by patients undergoing cardiac catheterization.

Table 1. Basic characteristics of the included studies in this systematic review.

First Author/ year	Location	Study characteristics			Age (mean±SD)	Control group	Key results	JBI Score
		1. Design	2. Sample Size (I/C)	3. Intervention				
Mansoorzadeh <i>et al.</i> , 2014 [21]	Iran	1. RCT 2. 70 (35/35) 3. Acupressure 4. N/A 5. 10 minutes 6. 0	51.43/ 48.57	55.13 (SD= 7.19)	People in the control group received acupressure on pseudo-points	The mean score of anxiety in patients decreased after the intervention in the intervention group compared to the control group (P<0.001).	Good	
Rajai <i>et al.</i> , 2015 [23]	Iran	1. RCT 2. 60 (30/30) 3. Acupressure 4. N/A 5. 10 minutes 6. 0	50/50	60.02 (SD= 8.38)	People in the control group received acupressure on the thumb of two hands.	The mean score of anxiety in patients decreased after the intervention in the intervention group compared to the control group (P=0.001)	Good	
Arami <i>et al.</i> , 2015 [19]	Iran	1. RCT 2. 125 (90/450) 3. Acupressure 4. N/A 5. 5 minutes 6. 0	57.04/ 42.96	58.10 (SD=10.40)	People in the control group received acupressure on false points	The mean score of anxiety in patients decreased after the intervention in the intervention groups compared to the control group (P<0.001).	Good	
Taghadosi <i>et al.</i> , 2016 [5]	Iran	1. RCT 2. 70 (35/35) 3. Acupressure 4. N/A 5. 10 minutes 6. 0	51.43/ 48.57	55.13 (SD= 7.19)	People in the control group received acupressure on false points	The mean score of anxiety in patients decreased after the intervention in the intervention group compared to the control group (P<0.001).	Good	
Rahimi <i>et al.</i> , 2020 [22]	Iran	1. RCT 2. 94 (47/47) 3. Acupressure 4. N/A 5. 4 minutes	100/0	47.50 (SD= 11.94)	People in the control group received acupressure on false points	The mean score of anxiety in patients decreased after the intervention in the intervention group	Good	

First Author/ year	Location	Study characteristics				Control group	Key results	JBI Score
		1. Design	2. Sample Size (I/C)	M/F ratio (%)	Age (mean±SD)			
		3. Intervention						
		4. Duration of study						
		5. Duration of intervention						
		6. Duration of follow-up						
		0					compared to the control group (P<0.001).	
Allahbakhshi et al., 2021 [14]	Iran	1. RCT 2. 90 (60/30) 3. Acupressure and ice bag 4. N/A 5. 35 minutes 6. 24 hours	55.56/ 44.44	55.25 (SD=9.36)	People in the control group did not receive acupressure	The mean score of pain in patients decreased after the intervention in the intervention groups compared to the control group (P<0.0001).	Good	
Rezvani et al., 2022 [24]	Iran	1. RCT 2. 75 (50/25) 3. Acupressure 4. N/A 5. 14 minutes 6. 0	60/40	61.55 (SD=12.21)	People in the control group did not receive acupressure	The mean score of pain in patients was decreased after the intervention in the acupressure group compared to the control group (P<0.001).	Good	
Vaghar-seyyedin et al., 2022 [25]	Iran	1. RCT 2. 117 (59/58) 3. Acupressure 4. 48 weeks 5. 16 minutes 6. 0	47.01/ 52.99	53.07 (SD=6.38)	People in the control group did not receive acupressure	The mean score of pain in patients decreased after the intervention in the intervention group compared to the control groups (P<0.05).	Good	
Derya Ister et al., 2022 [20]	Turkey	1. RCT 2. 80 (40/40) 3. Acupressure 4. N/A 5. 11 minutes 6. 0	N/A	N/A	People in the control group did not receive acupressure	The mean score of anxiety and pain in patients decreased after the intervention in the intervention group compared to the control group (P<0.0001).	Good	

	Mansoorzadeh et al., 2014	Rajaei et al., 2015	Arami et al., 2015	Taghadossi et al., 2016	Allahbakhshi et al., 2021	Rezvani et al., 2022	Vaghar-seyyedin et al., 2022	Ister et al., 2022	Rahimi et al., 2023
RCT									
Was true randomization used for assignment of participants to treatment groups?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Was allocation to treatment groups concealed?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Were treatment groups similar at the baseline?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Were participants blind to treatment assignment?	Y	Y	Y	Y	U	U	N	U	Y
Were those delivering treatment blind to treatment assignment?	Y	N	N	N	U	U	N	U	N
Were outcomes assessors blind to treatment assignment?	N	N	N	N	U	U	Y	U	N
Were treatment groups treated identically other than the intervention of interest?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	N	N	N	N	Y	N	N	N	N
Were participants analyzed in the groups to which they were randomized?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Were outcomes measured in the same way for treatment groups?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Were outcomes measured in a reliable way?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Was appropriate statistical analysis used?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	Y	Y	Y	Y	Y	Y	Y	Y	Y

Figure 2. Methodological quality assessment of RCT studies using JBI.

Table 2. Interventions of the studies are included in the systematic review.

First Author/ year	Intervention Program	Description
Mansoorzadeh <i>et al.</i> , 2014 [21]	Acupressure	Before commencing the intervention, the anxiety levels were assessed and recorded for two minutes. Acupressure was administered to both groups. In the experimental group, a plastic bead was initially placed on the Shenmen point of the non-dominant ear and pressed by the researcher for 10 minutes. Simultaneously, rotating movements were applied to the third eye point approximately 20 to 25 times over 10 minutes. In the control group, a similar pressure application was performed on pseudo points, specifically the outer corner of the left eyebrow and the beginning of the non-dominant ear cavity. Anxiety levels were evaluated and documented at three stages: in the angiography waiting area, immediately upon entering the angiography ward, and before drug injection.
Rajai <i>et al.</i> , 2015 [23]	Acupressure	Participants in the intervention group underwent acupressure on the P6 point, situated on the inner side of the forearm between the bones, approximately three finger widths above the wrist crease. This pressure was applied for ten minutes on both hands, starting with the right hand and then shifting to the left hand on the morning of the angiography. In contrast, the control group received the same pressure as the intervention group but on the thumb. The Spielberger State Anxiety Inventory was used to evaluate anxiety levels, with assessments conducted immediately before the intervention and half an hour after the intervention.
Arami <i>et al.</i> , 2015 [19]	Acupressure	Participants in the intervention groups underwent acupressure at two distinct points. In the first group, the acupressure intervention targeted the third eye point, or Yintang, situated between the eyebrows and the root of the nose. In the second group, acupressure was applied to the heart's Shenmen point or HE7, located on the side of the ulnar bone and pisiform bone. The intervention was administered 30 minutes before angiography and lasted for 5 minutes. Conversely, the control group received acupressure on a sham point located in the thenar muscles. The anxiety levels of participants were assessed one hour before and 10 minutes after the intervention using the Spielberger State Anxiety Inventory.
Taghadosi <i>et al.</i> , 2016 [5]	Acupressure	Participants in the intervention group simultaneously underwent acupressure on the third eye point and the Shenmen point of the non-dominant ear (determined based on right-handedness or left-handedness). The intervention involved pressing the Shenmen point of the ear with a finger for 10 minutes, while simultaneously applying circular pressure to the third eye point using the thumb at a rate of 20 to 25 times per minute for 10 minutes. In contrast, the control group received acupressure on sham points, specifically the outer corner of the left eyebrow and the beginning of the non-dominant ear cavity. Anxiety levels for participants in both groups were assessed 10 minutes before, one minute after, and thirty minutes after the intervention using the Spielberger State Anxiety Inventory.
Rahimi <i>et al.</i> , 2020 [22]	Acupressure	Participants in the intervention group had their non-dominant ears subjected to gentle counterclockwise pressure using the thumb, starting 60 minutes before angiography and lasting for 4 minutes. This pressure was applied to four specific points in the patient's ear, with each point receiving pressure for 1 minute. These points comprised Shenmen, Relaxation, Tranquilizer, and Endocrine. In the control group, pressure was applied to sham points. Anxiety levels were assessed 2 hours before angiography and 10 minutes after the intervention using The Depression, Anxiety, and Stress Scale-21 Items.
Allahbakhshi <i>et al.</i> , 2021 [14]	Acupressure and ice bag	The participants were divided into two intervention groups. In one group, acupressure was administered at the Hegu point 20 minutes before sheath removal, with the pressure applied for 20 minutes followed by a 15-second rest. A trained nurse executed this intervention using moderate thumb pressure. In the other group, a 10 x 15 cm ice pack with a temperature of 20°C was placed on the right femoral region for 15 minutes, and the sheath was removed concurrently with the ice pack's removal. The control group participants had their hands touched by the nurse for 20 minutes. Pain severity during sheath removal was measured using the Visual Analog Scale for participants in all groups.
Rezvani <i>et al.</i> , 2022 [24]	Acupressure	Participants in the intervention group received acupressure at four distinct points. These points were individually pressed using the thumb or index finger for a continuous 2-minute duration on each side. The first point, ST36, was located in the outer anterior area of the leg. The second point, GV26, was positioned under the nose. The third point, SI3, could be found on the outer edge of the palm at the end of the fold of the small bone. The fourth point, BL60, was situated between the outer ankle and the Achilles tendon. Pain severity was assessed using the Visual Analog Scale at intervals of 2, 4, 6, and 8 hours both before and after the intervention.
Vagharseyyedin <i>et al.</i> , 2022 [25]	Acupressure	Participants in the intervention group received acupressure on the right ear, targeting specific points including Shenmen, Kidney, and Spine. Each of these points was pressed with a probe pen, applying a pressure of one kilogram. The intervention was carried out for 8 minutes on each ear, totaling 16 minutes for both ears. Pain severity for participants was assessed at specific intervals: 20 minutes after entering the angiography ward and 2, 4, and 6 hours following the intervention. Pain intensity was measured using the Visual Analog Scale.
Derya Ister <i>et al.</i> , 2022 [20]	Acupressure	Participants in the intervention group received acupressure on the Hegu, Shenmen, and Yintang points, with the intervention lasting for eleven minutes. Pain intensity for the participants was assessed using the Visual Analog Scale, while their anxiety levels were evaluated using the Spielberger State Anxiety Inventory.

4.1 | Limitations

Similar to other systematic reviews, this study has certain limitations. Notably, a meta-analysis was not conducted. Nevertheless, the study adhered to a systematic and methodical approach to

data collection, organization, and analysis, even in the absence of a meta-analysis. Despite a comprehensive database search, there remains the possibility that some relevant studies on the topic were not identified. Additionally, it's important to acknowledge

that this systematic review exclusively incorporates research written in English, Persian, and Turkish. Consequently, studies in other languages may not have been included in the analysis.

4.2 | Implications for nursing managers and policy-makers

Hence, considering the findings of this study and the significance of minimizing and managing anxiety and pain levels in patients undergoing cardiac catheterization, healthcare professionals, including nurses, can employ acupressure as a means to reduce these levels.

4.3 | Recommendations for future research

In this systematic review, all the included studies originated from Iran or Turkey. As a suggestion, it is recommended that researchers in other countries explore the impact of acupressure on pain and anxiety in patients undergoing cardiac catheterization through interventional studies.

5 | Conclusions

In summary, the outcomes of this systematic review indicate that healthcare professionals, including nurses, have the potential to utilize acupressure as a means to alleviate both pain and anxiety.

Acknowledgements

Not applicable.

Authors' contributions

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work: TA, PT; Drafting the work or revising it critically for important intellectual content: TA, PT; Final approval of the version to be published: TA, PT; Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: TA, PT.

Funding

Self-funded.

Ethics approval and consent to participate

Not applicable.

Competing interests

We do not have potential conflicts of interest with respect to the research, authorship, and publication of this article.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on request.

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None.

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How to cite this article: Alizadeh T, Takasi P. Effect of acupressure on the anxiety and pain of patients undergoing cardiac catheterization: A systematic review. *J Nurs Rep Clin Pract.* 2024;2(2):74-81. <https://doi.org/10.32598/JNRCP.2401.1010>.