

# Yoga for Myocardial Infarction Care, What's the Recommendation?

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## Abstract

**Aims:** The study aims to reveal the effect of yoga in cardiac rehabilitation post-myocardial infarction.

**Methods:** This study is a systematic review. Literature searching was conducted in October 2023 in Pubmed and Google Scholar. Inclusion criteria include clinical trials in the last five years. Exclusion criteria if the study was a single-arm intervention.

**Results:** Findings included 6 RCTs conducted in India, Poland, and UK. Yoga as intervention given as rehabilitation program lead by instructors one time for 45 minutes up to 12 weeks. Yoga significantly improved bio and psychosocial domains.

**Conclusion:** Yoga is a potential therapeutic intervention for cardiac rehabilitation programs among myocardial infarction patients.

*Keywords:* yoga, cardiac infarct, ejection fraction, holistic care

## Introduction

The trend of heart and cardiovascular diseases (cardiovascular diseases or CVD) in the world is currently increasing. CVD cases increased by 77.12% from 31.31 million in 1990 to 55.45 million in 2019; deaths increased by 53.81% from 12.07 million in 1990 to 18.56 million in 2019 (Tsao et al., 2023). The classification of heart and blood vessel diseases in the general adult population includes coronary heart disease (CAD), brain and blood vessel disease (cerebrovascular disease), peripheral blood vessel disease (peripheral arterial disease), and blood vessel blockage (atherosclerotic disease) (Lopez, 2023). Meanwhile, hypertension is the main cause of heart disease with ICD code 10: I10. Another clinical condition is an electrical abnormality in the heart that causes the heart rate to become irregular, known as arrhythmia (Desai, 2023; Lopez, 2023).

In general, heart disease prevention is done by controlling lifestyle. WHO recommends a low-salt diet, consuming vegetables and fruit as fiber in the daily menu, physical exercise, not smoking and drinking alcohol, and controlling stress (WHO, 2021). Pharmacological therapy is widely used, such as antihypertensives, antiarrhythmics, anticoagulants, anticholesterol, and antidiabetics to control worsening conditions (Patoulas, 2020). Heart disease caused by blocked blood

vessels is usually treated surgically to perform revascularization (Al-Lamee et al., 2022; Patoulas, 2020).

The impact of heart disease on the adult population is massive. Physically, heart disease causes fatigue and leads to decreased productivity (Al-Lamee et al., 2022; Gecaite-Stonciene et al., 2021). Shortness of breath during rest and activities becomes a burden for the family as caregivers to fulfill daily activity needs (Gecaite-Stonciene et al., 2021). Psychologically, heart disease causes anxiety and depression (Rashid et al., 2023). Even spiritually it can cause distress. For this reason, treating heart disease requires a holistic and comprehensive approach (Ullah et al., 2023). Yoga can be an option as an alternative complementary therapy to maintain the health status of heart disease patients (Sharma et al., 2020). Yoga can be a complete sequence of exercises consisting of breathing exercises (pranayama), bodybuilding and stretching exercises (asana), and meditation (dhyana) (Prasanna Venkatesh & Vandhana, 2022). Many modified yoga practice sequences can be applied as a whole or in the form of separate practice sessions, for example only in the form of meditation without asana practice or only in the form of breathing exercises (Hinz et al., 2021). However, to improve evidence-based health services, it is necessary to conduct a literature study regarding the application of yoga in the care of heart disease patients. Based on our knowledge, there was limited evidence of yoga involvement in caring for patients with cardiac infarction. The aim of this study is to find the feasibility of yoga as part of holistic treatment from a health professional perspective.

## Methods

This research is a systematic literature review study. The research stages consist of formulating a search strategy, formulating eligibility criteria, critical review, and synthesis (Purnamayanti & Putra, 2021). The review process was done by both authors. First, the search strategy uses the keyword "Yoga And Heart Disease" in the Google Scholar, Proquest, Sage Journal, and Pubmed databases. Second, eligibility criteria are determined based on inclusion and exclusion criteria. Inclusion criteria are the results of clinical trial research in the last five years. Exclusion criteria were published as review articles, experimental studies without randomization and control groups, and descriptive study. Third, critical appraisal is performed using the JADAD score in Table 1 (Purnamayanti et al., 2021). The search results are presented in a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart described in Figure 1. Fourth, the synthesis of research results is presented in a summary content in Table 2.

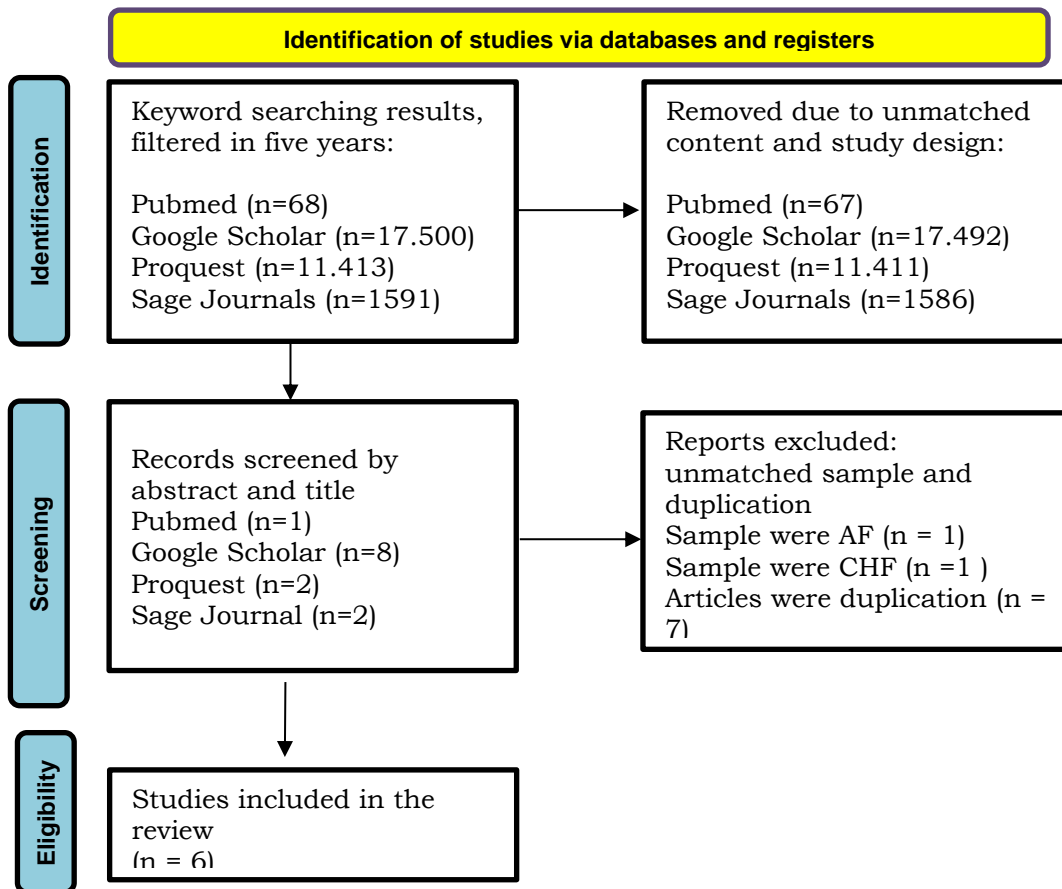
## Results

The study results were summarized by six RCT articles that involved yoga integrated with standard cardiac rehabilitation. The samples were CAD patients with a history of myocardial infarction (Amaravathi, 2018; Grabara et al., 2020; Prabhakaran et al., 2020; Rouhi et al., 2020; Sharma et al., 2020; Tillin et al., 2019) which two articles mentioned patients underwent Coronary artery bypass graft surgery (CABG) for revascularization (Rouhi et al., 2020; Sharma et al., 2020; Tillin et al., 2019), 1 article mentioned patients had angioplasty (Grabara et al., 2020), the rest were stable by medication treatment (Amaravathi, 2018; Prabhakaran et al., 2020). Most of the yoga interventions were varied, and the average is given for 12 weeks (Grabara et al., 2020; Prabhakaran et al., 2020; Sharma et al., 2020; Tillin et al., 2019), the longest was one year follow up (Amaravathi, 2018) and the shortest one session 45 minutes (Rouhi et al., 2020). The rest were given in one session of 75 minutes, 24 days,

followed for five years. We found three articles that measured echocardiography outcomes; two declared improvement in ejection fraction (Grabara et al., 2020; Sharma et al., 2020) and one declared no significant improvement (Tillin et al., 2019). In our findings, three articles found improvement in psychosocial outcomes (Amaravathi, 2018; Prabhakaran et al., 2020; Rouhi et al., 2020).

**Table 1.** Critical Appraisal Result

Author	Randomization	Description of Randomization method	Blinding	Description of Blinding method	Drop out<10%
(Sharma et al., 2020)	√	clear	√	Clear	√
(Tillin et al., 2019)	√	clear	√	Clear	√
(Grabara et al., 2020)	√	clear	√	Clear	√
(Amaravathi, 2018)	√	clear	√	Clear	√
(Prabhakaran et al., 2020)	√	clear	√	Clear	√
(Rouhi et al., 2020)	√	unclear	√	Unclear	√



**Figure 1.** Flowchart

**Table 2.** Content Summary

<b>Yoga Setting</b>	<b>Yoga Intervention</b>	<b>Cardiac Patient Samples</b>	<b>Result</b>
Hospital-based yoga training in 3 sessions (1 hour/session) led by certified Msc Yoga Trainer. Yoga therapy is given under supervised cardiologist and yoga master Cardiac rehabilitation care in India (Sharma et al., 2020)	After training, the patients practice at home three times a week for 12 weeks according to the module and CD player instructions. Every session contain asana, pranayama and meditation	Adult cardiac patients (30-50 yo) with recent myocardial infarction in last two months on medication treatment without revascularization; LVEF 30-50%, cardiac dysfunction NYHA I & II Total sample: 66 patients divided into 33 yoga group and 33 control group	Biomarker were not significantly Tg, LDL, HDL, and LVEF. Significant improvement in depression, anxiety, and quality of life measured by (HAM-A, CDS, DASI, METs)
24 yoga classes in 12 weeks alongside cardiac rehabilitation. Each session contains gentle exercises in deep relaxation, stretching, breathing, healing imagery, and a healthy diet. Cardiac rehabilitation in UK (Tillin et al., 2019)	Patients take at least join 18 yoga class and practice prescribed exercises on DVD (breathing exercises, yogic poses and meditations, education, and discussion) for 75 minutes per session.	Patients in cardiac rehabilitation sites who had CABG on their MI event were stable, according to the cardiologist's advice. Total samples 60 divided 25 into yoga groups and 35 control group	No significant improvement in echocardiography outcome and physical fitness was measured by 6MWT. High level drop out on yoga group
22 days of individualized actual hatha yoga training at Cardiac Ambulatory Rehabilitation in Poland (Grabara et al., 2020)	Specific easy poses for heart disease: sukhasana, fish pose, cobra pose, head knee pose, sitting with spinal twisting, sun salutation, pranayama, and a savasana for relaxation in 30 minutes/session	Male patient (45-65 yo) STEMI post angioplasty in cardiac rehabilitation phase II. Total samples 70 divided into control and yoga group	Significantly improved BMI, LVEF, LVEDD, and LVESD,
Integrate a yoga-based lifestyle, including asana, pranayama, astanga yoga (yama & dhyana), and counseling for one year of cardiac rehabilitation.  Post-cardiac rehabilitation care in Narayana Hrudayalaya Super Speciality Hospital (Amaravathi, 2018)	Yoga intervention including deep relaxation, mind sound resonance technique, quick relaxation, pranayama, standing asana, yama & niyama	Discharged patients post-CABG with double or triple vessel disease in recent five years, EF above 30%, and those residing within 200 km distance from the hospital. A total of 73 samples were divided into 36 control group and 37 yoga group	Significantly improved World Health Organization (WHO)-QOL BREF Questionnaire, Perceived Stress Scale, Positive and Negative Affect Scale (PANAS), and Hospital Anxiety and Depression Scale (HADS)

<b>Yoga Setting</b>	<b>Yoga Intervention</b>	<b>Cardiac Patient Samples</b>	<b>Result</b>
<p>13 direct contact sessions spread over 12 weeks, with the first session delivered within two weeks of the index cardiac event. The first two sessions were delivered individually and the remainder in groups at the hospital. 24 cardiac stites in India (Prabhakaran et al., 2020)</p>	<p>75 minutes and involved a set of gentle yoga exercises, including breath control, meditation and relaxation exercises, followed by a discussion on lifestyle and psychosocial concerns</p>	<p>Patients aged 18 to 80 years with acute myocardial infarction within the past 14 days were eligible if they were willing and able to complete the hospital-based cardiac rehabilitation program. Samples for yoga group 1.970 and control group 1.989.</p>	<p>Significantly improved pre-infarct activities and MACE score</p>
<p>Laughter yoga and meditation given by clinical psychologist at Cardiac Rehabilitation in Tehran (Rouhi et al., 2020)</p>	<p>A session of laughter yoga for about 45 minutes starts with an enjoyable talk. The exercise begins with moving hands up and down, vocalizing" HO, HO, HA-HA-HA" together with hands clapping, talk about some enjoyable things like national and religious ceremonies, having a positive attitude about life, and living at the moment. Moving hands up and down and switching from one side to the other, following the command of Up and down. Pure vocals are added to clapping, typically HO, HO, HA-HA-HA. At the end of each session, every participant shouts: "I am the happiest person in the world," then looks at others and laughs.</p>	<p>Patients undergo CABG (48-76 yo)without dramatic personality and taking antidepressants. The sample was 300 divided into 150 control group and 150 laughter yoga.</p>	<p>Significantly improved anxiety, depression, and quality of life measured by DASS, SF36,</p>

## Discussion

Based on our findings, all trials showed that yoga was safe for stable patients post-MI. Standard treatment for acute MI in hospitals was by medication and revascularization. Urgent care patients who experience chest pain would be diagnosed through 12 lead ECG and cardiac markers. The gold standard described on ST segment relief were abnormal known as STEMI or NSTEMI and increased cardiac biomarker troponin (I and II) serums (He et al., 2022). During acute periods, patients would be given nitrates sublingual, beta-blockers, an oral loading dose of 150 to 300 mg platelets inhibitors, and supplemental oxygen given to patients with hypoxia  $SpO_2 < 95\%$  and  $PaO_2 < 60\text{mmHg}$ . Further diagnostic procedures may needed to adjust the percentage of coronary artery blockage using coronary angiography. Coronary angiography results would drive the clinical findings on whether the treatment continued with the revascularization procedure or fibrinolysis only. Fibrinolysis is usually given streptokinase intravenous if the percutaneous coronary intervention (PCI) is unavailable (Heyne et al., 2023). Short blockage of coronary arteries would recommended for PCI; however, multiple or prolonged ones would recommended for coronary artery bypass graft (CABG). The acute phase post-PCI would be monitored on ICCU usually two days and seven days after may started daily activity. The acute phase post-CABG would close observation on ICCU and 2-6 weeks convalescence period in hospital.

During the acute phase, yoga is not recommended. Yoga is safe given during cardiac rehabilitation (Akbar, 2022). The stable condition parameter showed no chest pain during daily activity, no hypertension, ECG showed no arrhythmia or abnormal ST segment, left ventricular ejection fraction (LVEF) on echocardiography  $> 35\%$ , metabolic equivalents (mets)  $> 7$ . Excised is safe given as cardiac rehabilitation 18 days post PCI. However, cardiac rehabilitation post-CABG is classified into four phases (Cakrawala, 2021). Phase I in patients given a 6-minute walking test integrated with psychosocial encouragement. Phase II outpatients were given endurance and resistance training after 1-3 weeks of discharge and flexibility training after 3-5 weeks of discharge. Phase III maintenance starts 3-6 weeks after discharge when patients' tolerance is as good as the benefit of the previous rehabilitation phase.

In previous literature studies, yoga had a specific impact on cardiac rehabilitation (Kalra et al., 2022). Asana as physical cardiac rehabilitation in yoga, would enhance cardiac function. In autonomic disorders, yoga can lower the pulse, increase vagal output, and reduce sympathetic stimulation. In cardiac arrhythmias, it can reduce episodes of atrial fibrillation, reducing the incidence of fatal ventricular disorders. In patients with coronary heart disease, it can reduce angina episodes. In heart failure patients, episodes of yoga practice increase oxygen consumption and physical capacity. However, there is no evidence that yoga can reduce mortality. For this reason, a comprehensive approach to cardiac rehabilitation care is recommended. Asana poses recommended for patients with MI standing position (Ardha Kati Chakrasana - lateral half wheel posture; Trikonasana - triangle posture; Vrikshasana - tree posture Garudasana - eagle posture), sitting position (Vakrasana - spinal twist with leg straight posture, Ardha Matsyendrasana - half spinal twist posture Vajrasana - diamond posture) (Rouhi et al., 2020). Asana poses are not recommended for MI patients Chakrasana (Wheel pose), Halasana (Plough pose), Karnapirasana (Ear closing pose), Sarvangasana (Shoulder stand), Sirshasana (Headstand), Viparita Karani (Simple inverted pose). The opposed gravity pose was forbidden for patients with heart disease due to an anatomical point of view, it would increase cardiac demand, increase atrial filling, and increase ventricular ejection function.

Yoga as therapy does not only include body postures but also includes breathing exercises. Respiratory exercises that have an impact on heart disease, including hypertension are known as the Anuloma Viloma technique (Kanorewala & Suryawanshi, 2022). Anuloma Viloma is nostril breathing, namely inhaling and exhaling through the nose. In Anajara Veda, this technique is known as Nadhi Sodham, which means purifying the heartbeat. The nasal cycle depends on the limbic function of the autonomic nervous system, the proportion of catecholamines, and neurohormones circulating in the blood. In the ANB technique, breathing begins from the base of the diaphragm on both sides of the lungs in the pelvic girdle. The diaphragm muscles in the thoracic area and additional respiratory muscles in the neck are relaxed, thereby relaxing the facial muscles. When the facial muscles relax, this effect is carried to the organs associated with perception, viz. eyes, ears, nose, tongue, and skin, by reducing stress from the brain. Other breathing techniques that are useful for treating heart disease are Bhramari pranayama (bee breathing) and Ujjayi pranayam (loud breathing) (Trivedi & Saboo, 2021). In Bhramari Pranayama, the practitioner will sit in any comfortable position and inhale and exhale slowly and deeply through the nostrils. When exhaling, it must make a sound (humming sound) like the sound of a bee through the nasal airway, keeping the oral cavity closed with your lips and ears covered with your fingers (Upadhyay et al., 2023). Ujjayi is a Sanskrit compound term that includes "ud," which means superiority or power, and "jaya" which means victory, success or conquest, giving it the meaning of a superior breath of victory. This technique is reported to reduce cardiovascular changes due to stress and anxiety by restoring cardiovascular autonomic balance (Moreno-Gutiérrez et al., 2023).

The final yoga practice session is usually meditation. Meditation techniques are suitable for heart disease patients including Chanting, Mindfulness meditation, and Shavasana (relaxation training). Chanting is a mantra-based meditation (MBM) generally involving the continuous repetition of words, phrases, or series of syllables (either silently or aloud) with or without religious/spiritual content. The sound of mantras in meditation is the main form of awareness for most people and to divert negative thoughts (Álvarez-Pérez et al., 2022). In the literature, it is written that mindfulness meditation is done by positioning the body in a relaxed state in a sitting position, and the mind is focused on breathing so that awareness of "stretch and breath" is formed to observe the sensation of the body's response when breathing "body scan" (Toussaint et al., 2021). The savasana relaxation technique is a supine sleeping pose with anatomical hands and feet like a corpse, followed by guidance for guided muscle relaxation, focused awareness on breathing, and relaxation of the muscles and organs of the body. Savasana relaxation is useful in lowering blood pressure through the sympathetic vagal response (Chetry et al., 2023).

In maintaining the safety of yoga as a form of therapy, proper instructor supervision is required to prevent side effects (Cramer et al., 2019). Certain stages of Hatha yoga can cause gastric disorders such as nausea, vomiting, and musculoskeletal disorders at heavy exercise intensity. Hatha yoga is safe to do by modifying certain poses; for example, in heart failure patients with atrophy, the poses can be done using a chair and accompanied by monitoring metabolic consumption. For this reason, Kundalini yoga can cause Kundalini syndrome, which consists of headaches, motor and sensory effects, high blood pressure, increased heart rate, insomnia, and psychosocial problems.

### **Limitations**

The limitation of this study was that it showed the application of yoga integrated with cardiac rehabilitation in MI patients. Future research recommended to increased number of literature, scope of countries, and similar treatment revascularization.

### **Contribution to global nursing practice**

Yoga as part of alternative and complementary therapy is feasible to integrate into cardiac rehabilitation care in hospitals. Yoga become a trend in tourism health industries in the future and should be developed well as part of priority service in health destination centers. Nurses play strategic roles in order to develop therapeutic yoga for special cases.

### **Conclusion**

Yoga is a holistic intervention that is safe and feasible to apply to patients with heart disease. Physically, yoga provides light-intensity exercise accompanied by rhythmic breathing exercises, which have an impact on the patient's cardio-respiratory system. Psychologically, yoga is a mind and body therapy that helps reduce stress and tension in brain waves so that in the long term it affects the patient's quality of life. Spiritually, yoga helps manage energy and body vibrations which is implemented in the form of plant-based food and meditation at the end of the practice session.

### **Author Contribution**

NKP first author designed the method, searched online, and summarized the content. AA second author documented the searching process. NKP and AA have done the critical appraisal. Both author completes each author to finish the manuscript.

### **Conflict of interest**

Authors state no conflict of interest.

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### **Reference**

- Akbar, H. (2022). Cute ST Elevation Myocardial Infarction. [https://www.ncbi.nlm.nih.gov/books/NBK532281/#\\_ncbi\\_dlg\\_citbx\\_NBK532281](https://www.ncbi.nlm.nih.gov/books/NBK532281/#_ncbi_dlg_citbx_NBK532281)
- Al-Lamee, R. K., Foley, M., Rajkumar, C. A., & Francis, D. P. (2022). Revascularization in stable coronary artery disease. *BMJ (Clinical Research Ed.)*, 377, e067085. <https://doi.org/10.1136/bmj-2021-067085>
- Álvarez-Pérez, Y., Rivero-Santana, A., Perestelo-Pérez, L., Duarte-Díaz, A., Ramos-García, V., Toledo-Chávarri, A., Torres-Castaño, A., León-Salas, B., Infante-Ventura, D., González-Hernández, N., Rodríguez-Rodríguez, L., & Serrano-Aguilar, P. (2022). Effectiveness of Mantra-Based Meditation on Mental Health: A Systematic Review and Meta-Analysis. *International Journal of Environmental Research and Public Health*, 19(6), 3380. <https://doi.org/10.3390/ijerph19063380>
- Amaravathi, E. (2018). *Yoga - Based Postoperative Cardiac Rehabilitation Program for Improving Quality of Life and Stress Levels : Fifth - Year Follow - up through a Randomized Controlled Trial*. <https://doi.org/10.4103/ijoy.IJOY>
- Cakrawala. (2021). Rehabilitasi Pasca Coronary Artery Bypass Graft Surgery.



- [https://news.unair.ac.id/2021/08/24/rehabilitasi-pasca-coronary-artery-bypass-graft-cabg/?lang=id#:~:text=Phase rehabilitasi pasien CABG dibagi,sakit serta untuk mencegah kekambuhan.](https://news.unair.ac.id/2021/08/24/rehabilitasi-pasca-coronary-artery-bypass-graft-cabg/?lang=id#:~:text=Phase%20rehabilitasi%20pasien%20CABG%20dibagi,sakit%20serta%20untuk%20mencegah%20kekambuhan.)
- Chetry, D., Singh, J., Chhetri, A., Katiyar, V. K., & Singh, D. S. (2023). Effect of yoga on intra-ocular pressure in patients with glaucoma: A systematic review and meta-analysis. *Indian Journal of Ophthalmology*, 71(5), 1757–1765. [https://doi.org/10.4103/ijo.IJO\\_2054\\_22](https://doi.org/10.4103/ijo.IJO_2054_22)
- Cramer, H., Quinker, D., Schumann, D., Wardle, J., Dobos, G., & Lauche, R. (2019). Adverse effects of yoga: A national cross-sectional survey. *BMC Complementary and Alternative Medicine*, 19(1), 1–10. <https://doi.org/10.1186/s12906-019-2612-7>
- Desai, D. (2023). Arrhythmia. <https://www.ncbi.nlm.nih.gov/books/NBK558923/>
- Gecaite-Stonciene, J., Hughes, B. M., Burkauskas, J., Bunevicius, A., Kazukauskienė, N., van Houtum, L., Brozaitienė, J., Neverauskas, J., & Mickuviene, N. (2021). Fatigue Is Associated With Diminished Cardiovascular Response to Anticipatory Stress in Patients With Coronary Artery Disease. *Frontiers in Physiology*, 12, 692098. <https://doi.org/10.3389/fphys.2021.692098>
- Grabara, M., Nowak, Z., & Nowak, A. (2020). Effects of Hatha Yoga on Cardiac Hemodynamic Parameters and Physical Capacity in Cardiac Rehabilitation Patients. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 40(4), 263–267. <https://doi.org/10.1097/HCR.0000000000000503>
- He, J., Bellenger, N. G., Ludman, A. J., Shore, A. C., & Strain, W. D. (2022). Treatment of myocardial ischaemia-reperfusion injury in patients with ST-segment elevation myocardial infarction: promise, disappointment, and hope. *Reviews in Cardiovascular Medicine*, 23(1), 23. <https://doi.org/10.31083/j.rcm2301023>
- Heyne, S., Macherey, S., Meertens, M. M., Braumann, S., Nießen, F. S., Tichelbäcker, T., Baldus, S., Adler, C., & Lee, S. (2023). Coronary angiography after cardiac arrest without ST-elevation myocardial infarction: a network meta-analysis. *European Heart Journal*, 44(12), 1040–1054. <https://doi.org/10.1093/eurheartj/ehac611>
- Hinz, A., Mulgrew, K. E., De Regt, T., & Lovell, G. (2021). Practice or performance? A content analysis of yoga-related videos on Instagram. *Body Image*, 39, 175–183. <https://doi.org/10.1016/j.bodyim.2021.08.002>
- Kalra, S., Miraj, M., Ajmera, P., Shaik, R. A., Seyam, M. K., Shawky, G. M., Alasiry, S. M., Mohamed, E. H., Alasiri, H. M., Alzhrani, M., Alanazi, A., Alqahtani, M., Shaikh, A. R., Al-Otaibi, M. L., Saleem, S., Pal, S., Jain, V., & Ahmad, F. (2022). Effects of Yogic Interventions on Patients Diagnosed With Cardiac Diseases. A Systematic Review and Meta-Analysis. *Frontiers in Cardiovascular Medicine*, 9(August). <https://doi.org/10.3389/fcvm.2022.942740>
- Kanorewala, B. Z., & Suryawanshi, Y. C. (2022). The Role of Alternate Nostril Breathing (Anuloma Viloma) Technique in Regulation of Blood Pressure. *Asian Pacific Journal of Health Sciences*, 9(2), 48–52. <https://doi.org/10.21276/apjhs.2022.9.2.12>
- Lopez, O. (2023). Cardiovascular Disease. <https://www.ncbi.nlm.nih.gov/books/NBK535419/>
- Moreno-Gutiérrez, J. Á., de Rojas Leal, C., López-González, M. V., Chao-Écija, A., & Dawid-Milner, M. S. (2023). Impact of music performance anxiety on cardiovascular blood pressure responses, autonomic tone and baroreceptor sensitivity to a western classical music piano-concert. *Frontiers in Neuroscience*, 17(July). <https://doi.org/10.3389/fnins.2023.1213117>
- Patoulias, D. (2020). Pharmacological Management of Cardiac Disease in Patients with Type 2 Diabetes: Insights into Clinical Practice. *Current Vascular*

- Pharmacology*, 8(12). <https://doi.org/10.2174/1570161117666190426162746>
- Prabhakaran, D., Chandrasekaran, A. M., Singh, K., Mohan, B., Chattopadhyay, K., Chadha, D. S., Negi, P. C., Bhat, P., Sadananda, K. S., Ajay, V. S., Singh, K., Praveen, P. A., Devarajan, R., Kondal, D., Soni, D., Mallinson, P., Manchanda, S. C., Madan, K., Hughes, A. D., ... Madappa, N. U. (2020). Yoga-Based Cardiac Rehabilitation After Acute Myocardial Infarction: A Randomized Trial. *Journal of the American College of Cardiology*, 75(13), 1551–1561. <https://doi.org/10.1016/j.jacc.2020.01.050>
- Prasanna Venkatesh, L., & Vandhana, S. (2022). Insights on Surya namaskar from its origin to application towards health. *Journal of Ayurveda and Integrative Medicine*, 13(2), 1–9. <https://doi.org/10.1016/j.jaim.2021.10.002>
- Purnamayanti, N. K. D., & Putra, M. G. A. (2021). Complementary and Alternative Therapy To Reduce Fatigue Among Oncology Patient Under Chemotherapy: a Nursing Perspective. *Indonesian Contemporary Nursing Journal*, 6(1), 38–46.
- Purnamayanti, N. K. D., Sutrisna, I. G. A. A., & Kresnayana, M. Y. (2021). Herbs In Treatment Covid 19, Recommended Or Not? *Jurnal Aisyah: Jurnal Ilmu Kesehatan*, 6, 21–26. <https://doi.org/10.30604/jika.v6is1.755>
- Rashid, S., Gulfam, A., Noor, T. A., Yaseen, K., Sheikh, M. A. A., Malik, M., & Malik, J. (2023). Anxiety and Depression in Heart Failure: An Updated Review. *Current Problems in Cardiology*, 48(11), 101987. <https://doi.org/10.1016/j.cpcardiol.2023.101987>
- Rouhi, S., Etemadi, S., & Pooraghajan, M. (2020). Laughter in Combination with Yoga Exercises: Changes in Psychological Distress and Quality of Life in Patients with Coronary Heart Disease (CHD). *The Open Psychology Journal*, 13(1), 144–150. <https://doi.org/10.2174/1874350102013010144>
- Sharma, K. N. S., Pailoor, S., Choudhary, N. R., Bhat, P., & Shrestha, S. (2020). Integrated Yoga Practice in Cardiac Rehabilitation Program: A Randomized Control Trial. *The Journal of Alternative and Complementary Medicine*, 26(10), 918–927. <https://doi.org/10.1089/acm.2019.0250>
- Tillin, T., Tuson, C., Sowa, B., Chattopadhyay, K., Sattar, N., Welsh, P., Roberts, I., Ebrahim, S., Kinra, S., Hughes, A., & Chaturvedi, N. (2019). Yoga and Cardiovascular Health Trial (YACHT): a UK-based randomised mechanistic study of a yoga intervention plus usual care versus usual care alone following an acute coronary event. *BMJ Open*, 9(11), 1–18. <https://doi.org/10.1136/bmjopen-2019-030119>
- Toussaint, L., Nguyen, Q. A., Roettger, C., Dixon, K., Offenbächer, M., Kohls, N., Hirsch, J., & Sirois, F. (2021). Effectiveness of Progressive Muscle Relaxation, Deep Breathing, and Guided Imagery in Promoting Psychological and Physiological States of Relaxation. *Evidence-Based Complementary and Alternative Medicine*, 2021. <https://doi.org/10.1155/2021/5924040>
- Trivedi, G. Y., & Saboo, B. (2021). Bhramari Pranayama – A simple lifestyle intervention to reduce heart rate, enhance the lung function and immunity. *Journal of Ayurveda and Integrative Medicine*, 12(3), 562–564. <https://doi.org/10.1016/j.jaim.2021.07.004>
- Tsao, C. W., Aday, A. W., Almarzooq, Z. I., Anderson, C. A. M., Arora, P., Avery, C. L., Baker-Smith, C. M., Beaton, A. Z., Boehme, A. K., Buxton, A. E., Commodore-Mensah, Y., Elkind, M. S. V., Evenson, K. R., Eze-Nliam, C., Fugar, S., Generoso, G., Heard, D. G., Hiremath, S., Ho, J. E., ... Martin, S. S. (2023). Heart Disease and Stroke Statistics - 2023 Update: A Report from the American Heart Association. In *Circulation* (Vol. 147, Issue 8). <https://doi.org/10.1161/CIR.0000000000001123>
- Ullah, A., Kumar, M., Sayyar, M., Sapna, F., John, C., Memon, S., Qureshi, K., Agbo, E. C., Ariri, H. I., Chukwu, E. J., Varrassi, G., Khatri, M., Kumar, S., Elder, N. M., & Mohamad, T. (2023). Revolutionizing Cardiac Care: A Comprehensive

Narrative Review of Cardiac Rehabilitation and the Evolution of Cardiovascular Medicine. *Cureus*, 15(10). <https://doi.org/10.7759/cureus.46469>

Upadhyay, J., S, N. N., Shetty, S., Saoji, A. A., & Yadav, S. S. (2023). Effects of Nadishodhana and Bhramari Pranayama on heart rate variability, auditory reaction time, and blood pressure: A randomized clinical trial in hypertensive patients. *Journal of Ayurveda and Integrative Medicine*, 14(4), 100774. <https://doi.org/https://doi.org/10.1016/j.jaim.2023.100774>

WHO. (2021). Cardiovascular Disease. [https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds))