Review Article

Prevalence of psychiatric disorders in patients with ischemic heart disease: A systematic review and meta-analysis

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Background: Ischemic heart disease and psychiatric disorders are among the leading causes of morbidity and mortality. Plans for providing basic health services to community members require knowledge of the current state. Therefore, the aim of this study was to systematically review the literature to estimate the prevalence of psychiatric disorders among patients with ischemic heart disease. **Materials and Methods:** In this study, PubMed, Embase, and Web of Science were systematically searched to find studies published before June 6, 2021. The systematic review included all original articles on the prevalence of psychiatric disorders among patients with ischemic heart disease. Two independent researchers evaluated the quality of studies, using the Joanna Briggs Institute questionnaire. All analyses were performed in Stata/MP version 16. A random-effects model was used for data analysis. **Results:** Of 1672 studies initially identified, 13 studies were included in our meta-analysis, with a total of 2233 participants. The overall prevalence of psychiatric disorders was estimated at 46.85% (95% confidence interval [CI]: 36.08–57.62; I^2 = 100%; P < 0.001 for heterogeneity). The most common disorder was depression (27.80%; 95% CI: 18.27–37.34; I^2 = 99.99%; P < 0.001 for heterogeneity). Based on the results, the prevalence of psychiatric disorders had increased by 25.55% from 2000 to 2021 compared to1984–2000. **Conclusion:** The prevalence of psychiatric diseases in people with ischemic heart disease is high and increases over time. It is recommended that preventive measures be taken worldwide.

Key words: Chest pain, myocardial ischemia, prevalence, psychosomatic disorders

How to cite this article: Derisi MM, Nasiri MJ, Aryan A, Mosavi Jarrahi A, Amiri P, Mohseny M. Prevalence of psychiatric disorders in patients with ischemic heart disease: A systematic review and meta-analysis. J Res Med Sci 2022;27:12.

INTRODUCTION

Researchers have always shown interest in monitoring the status of psychiatric medicine in different countries.[1] Studies show that psychiatric disorders are the most common problems in the primary health-care setting.[2] These disorders include interactions between the mind and the body, as the brain sends different messages, which influence the individual's consciousness and report a serious problem. There are unknown mental and cerebral mechanisms, associated with minor or undetectable changes in neuronal chemistry and neuro-immune system, leading to psychiatric disorders.[3]

Ischemic heart disease (IHD) and psychiatric disorders cost the world health economy a lot. Researchers have shown associations between IHD and psychiatric disorders and have suggested their mutual impact on one another.[4]

According to previous studies, the most frequent psychosomatic symptoms among cardiac patients were chest pain (52.8%), fatigue (52.8%) shortness of

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Quick Response Code:

Website: www.jmsjournal.net

DOI: 10.4103/jrms.JRMS_864_20

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Submitted: 28-Jul-2020; **Revised:** 30-May-2021; **Accepted:** 30-Sep-2021; **Published:** 18-Feb-2022

breath (49.4%), heart palpitation (47.8%), arm and leg pains (42.8%), back pain (25%), sleep disorder (21.7%), headache (19.4%), stomach pain (18.9%), dizziness (15%), and nausea (13.9%).[5]

For classification and diagnosis of psychiatric disorders, such as palpitations, tremors, sweating, dry mouth, chest pain, headache, dyspepsia, and stomachache, we cannot simply attribute them to a known disease.[6] On the other hand, it seems that the recent coronavirus disease-2019 pandemic may lead to a higher incidence of psychiatric disorders due to quarantine-related stress.[7]

Considering the complexity of diagnosis, mental disorders impose a significant burden on the health-care systems. Plans for providing basic mental health services to community members also require knowledge of the current status of mental disorders in the community. Therefore, we aimed to conduct a systematic review of global studies, according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines,[8] to determine the approximate prevalence and different types of psychiatric disorders in an adult population with IHD.

MATERIALS AND METHODS

Search strategy

We conducted a systematic and comprehensive search in Embase, PubMed, and Web of Science to find studies published before June 6, 2021. We used an iterative process to develop a search strategy, conduct the search, extract relevant articles for additional terms, and then, reconstruct the search strategy, using the newly identified terms and the related Medical Subject Headings terms. The final search strategy is presented in Table S1. Moreover, we screened the reference lists of the extracted studies and evaluated the related journals to retrieve more articles.

The study protocol was registered in the PROSPERO database and approved (accessible on https://www.crd.york.ac.uk/prospero/display_record.php?ID = CRD42019129697). The Ethics Committee of Shahid Beheshti University of Medical Sciences approved the study (Approval ID: IR.SBMU.MSP.REC.1397.642).

Inclusion and exclusion criteria

All original articles, including cross-sectional and cohort studies on the prevalence of psychosomatic disorders in patients with IHD, were reviewed in this study, and articles published in English were included. The study population consisted of adult populations aged between 18 and 80 with the documentation of IHD, without any restrictions on gender, geographical region, or type of mental disorder.

The exclusion criteria were as follows: (1) studies on the prevalence of mental diseases in the general community; (2) researches investigating the prevalence of mental diseases in patients with chest pain to determine the source of pain; (3) congress abstracts; (4) studies in languages other than English; (5) duplicate publications; and (6) studies with only available abstracts.

The main outcome of this research was to assess the prevalence of psychiatric disorders in persons with IHD.

Quality assessment

The quality assessment of the studies was based on the Joanna Briggs Institute (JBI) model of evidence-based health care for outbreak studies, consisting of three main parts: quality of methodology (preventing systematic errors through proper design and implementation of the study); accuracy of the study (probability of a random error, usually expressed by the degree of confidence interval [CI]); and external validity (level of generalizability or applicability of the results to the target population). Two independent researchers (Mohamad Mehdi Derisi and Alisam Aryan) evaluated the quality of studies, and any potential disagreements were resolved by mutual agreement and a third party (Maryam Mohseny) as the referee.

Data extraction

Studies were reviewed and selected in three stages. In the first stage, the citation information, along with a summary of articles extracted from the databases, was transferred to EndNote. Next, the titles of the selected articles were reviewed, and those unrelated to our main subject matter were removed. In the second stage, by studying the abstracts of the remaining articles, those related to the main purpose of our review were selected. In the third stage, the full text of the remaining articles was read, and the final decision was made, based on the inclusion/exclusion criteria, using a standard electronic form, including the source (i.e., journal name, title, and authors), goal (i.e., purpose of the study expressed by the authors), population (i.e., demographic data of the population), outcomes (i.e., prevalence and type of psychiatric disorders and method of measurement, including statistical techniques), and description (i.e., details of the study quality).

Two authors (Mohamad Mehdi Derisi and Alisam Aryan) screened the titles and abstracts of the articles, which were extracted, using a systematic search strategy. Disagreements were resolved by a third person (Maryam Mohseny) as the referee. Regarding the remaining papers, the two reviewers read the full text of the articles independently. Disagreements between the reviewers were clarified by a third person (Maryam Mohseny), and agreements were reached.

Statistical analysis

Statistical analyses were performed using the Metan package of Stata/MP Version 16 (Stata Corp. LP, USA). The standard deviation and 95% CI were calculated. For meta-analyses, I^2 statistics were measured to examine heterogeneity. A random-effects model was also used when the existing statistical heterogeneity was greater than $I^2 > 50\%$. The groups were classified, based on the type of psychiatric disorder.

RESULTS

We determined 1672 records in our initial search of databases. After removing duplicates, a total of 1452 articles remained. However, we discarded 1149 articles after screening the titles. Next, the abstracts of 303 studies were reviewed, and 87 articles were entered in full-text evaluation. After full-text evaluation, the reference lists of the articles were also searched to find more relevant articles; four other articles were extracted by reviewing the reference lists. Of the remaining 91 full-text articles, 36 studies were included in the quality assay phase, based on the standard JBI model. Finally, 13 articles were included in the analysis. Eleven studies were found to be of high quality, and two studies had a good quality [Table S2]. The study retrieval and screening processes are presented in Chart 1. A summary of the risk of bias and further details are reported in Figure 1.

Table 1 lists the details of the admitted studies (n = 13). The publication dates ranged from 1984 to 2021. A total of 2233 participants were included in the studies. The lowest prevalence of psychiatric disorders was reported by Katon W. in Washington, USA (26.08%), whereas the highest prevalence was reported by Bahremand M. in Iran (87.77%). Overall, we extracted 13 studies, reporting the prevalence of psychiatric disorders. The heterogeneity among the studies was high (I^2 = 100%; P = 0.00). Next, a random-effects model was applied. The overall prevalence of psychiatric disorders was estimated at 46.85% (95% CI: 36.08–57.62) [Figure 2]. Publication bias tests are shown in Figure 3 (P = 0.85 for Begg's test; P = 0.027 for Egger's test).

In terms of psychiatric disorders, depression was the most common (27.80%; 95% CI: 18.27–37.34), whereas panic disorder had the lowest prevalence (14.76%; 95% CI: −4.53–34.09). The prevalence of psychiatric disorders had increased by 25.55% from 1984 to 2000 [Table 2].

DISCUSSION

In this study, we addressed the prevalence of psychiatric diseases in patients with IHD. Psychiatric disorders include a wide range of conditions, characterized by somatic signs and symptoms. They are associated with physical disorders, such as cardiovascular, respiratory, and gastrointestinal disorders.[20]

Chest pain is a common symptom of cardiovascular disease. The origin of chest pain can be either cardiac (coronary and noncoronary) or noncardiac.[21] Studies have shown that pain has a noncardiac origin in 50% to 80% of patients with a cardiovascular disease.[22] The cause of noncardiac chest pain can be gastrointestinal disorders, neck arthritis and pain, psychological factors, and especially pulmonary diseases.[23]

This research aimed to investigate the prevalence of psychiatric disorders in people with IHD. However, some studies have investigated the prevalence of these diseases in persons with chest pain to only determine the source of pain. Furthermore, some other studies have examined the differences in the prevalence of psychiatric disorders in two groups of people with cardiac chest pain and noncardiac chest pain. From this group of studies, those patients who had chest pain due to IHD were included in our study. Moreover, some researches have reported the prevalence of these disorders in the general population.

Table 1: The details of the admitted studies

Reference number	First author	Date of publication	Country	Total population	Psychosomatic population
[9]	Kohlmann *et al.*	2013	Germany	387	175
[2]	Alkhadhari *et al.*	2018	Kuwait	48	29
[5]	Bahremand *et al.*	2021	Iran	180	158
[10]	Bass	1984	London	68	23
[11]	Birket-Smith and Rasmussen	2008	Denmark (Copenhagen)	86	34
[12]	Kisely *et al.*	1992	England (Manchester)	71	19
[13]	Alexander *et al.*	1994	India	30	9
[14]	Lambertus *et al.*	2018	Germany	569	470
[15]	Mangelli *et al.*	2009	Italy	153	80
[16]	Podgórna *et al.*	2007	Poland	36	18
[17]	Porcelli *et al.*	2012	Italy	116	42
[18]	Katon *et al.*	1988	USA (Washington)	46	12
[19]	Yin *et al.*	2019	China	443	170

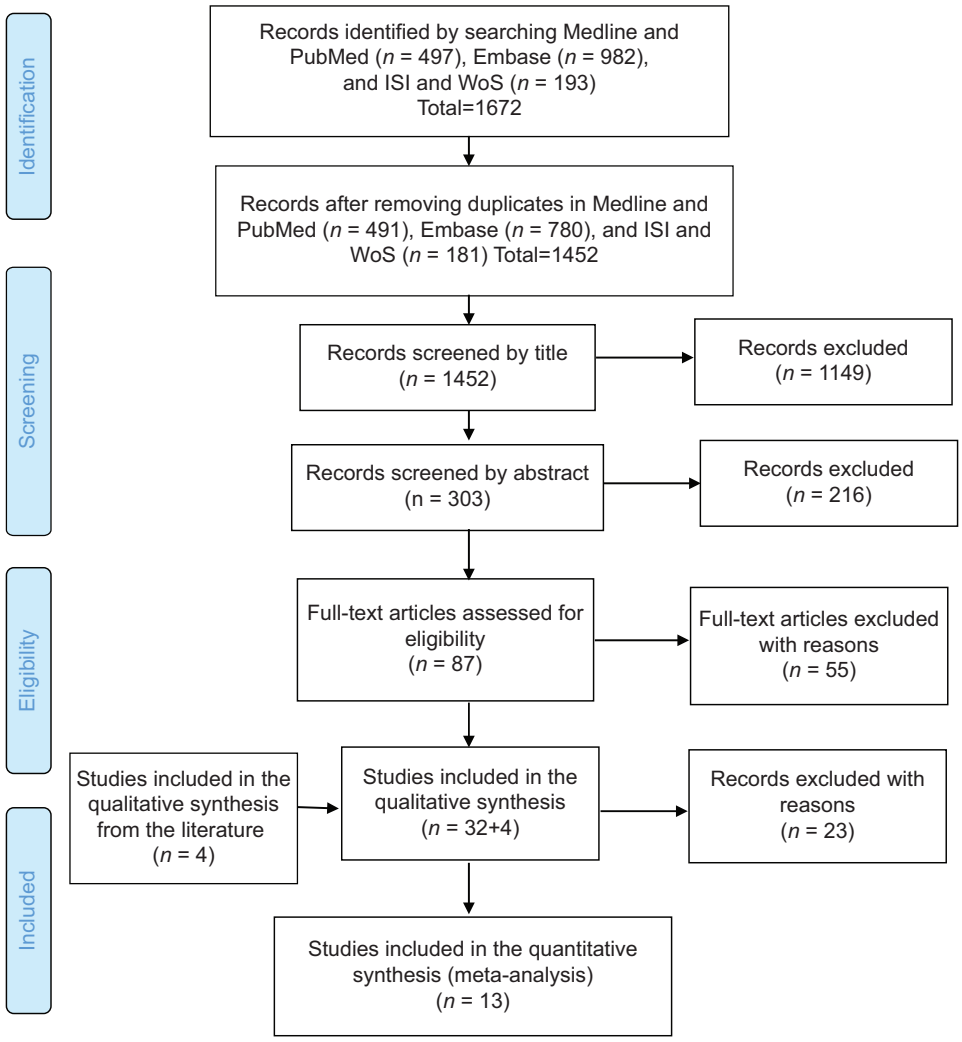

Chart 1: The PRISMA flowchart

Table 2: Subgrouping of the studies

Subgroups	Number of studies	Pooled prevalence (95% CI)		Heterogeneity test		Egger's test	
				I^2 (%)	*P*	*t*	*P*
Depression	8	27.80	(18.27-37.34)	99.99	<0.001	−4.52	0.004
Alcohol abuse	6	20.88	(−1.61-43.37)	100	0.069	−1.01	0.379
Panic disorder	4	14.76	(−4.53-34.09)	99.97	0.04	−0.32	0.782
Anxiety	8	25.42	(14.07-36.78)	99.99	<0.001	−0.60	0.571
Somatization	4	25.93	(8.20-43.67)	100	0.01	−1.23	0.344
By year							
After 2000	9	54.71	(42.35-67.07)	100	<0.001	−1.49	0.179
Before 2000	4	29.16	(25.26-33.07)	99.4	<0.001	−0.61	0.602

CI=Confidence interval

According to previous studies, in the Netherlands, the prevalence of mental disorders among the community population ranges from 1.6% to 70% in young people, 2.4% to 87% in middle-aged people, and 4.6% to 18% in the elderly.[24] In addition, the prevalence rate of these disorders is estimated at 21.9% in England.[25] Similarly, studies from the United States and Canada have reported a prevalence range of 1.5% to 11%.[26,27] The prevalence of mental disorders among internal medical inpatients is estimated at 18.1% in Denmark.[28]

The findings of this systematic review showed that the prevalence of psychiatric disorders was high in patients with IHD. Compared to the general population, the prevalence of psychiatric diseases is higher in people with heart disease.[9,29] The results of our meta-analysis

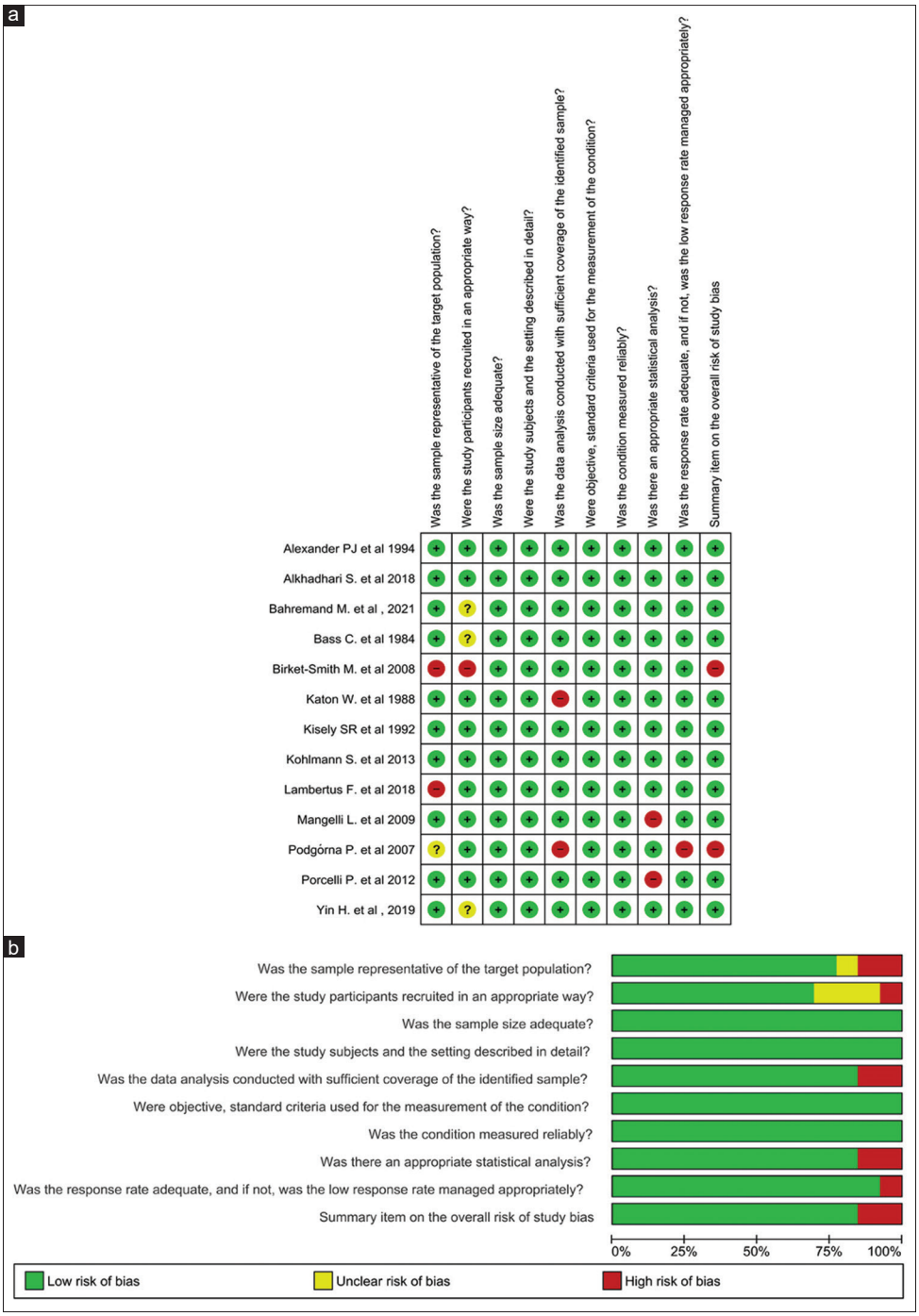

Figure 1: Summary of Joanna Briggs Institute risk of bias assessment. (a) Risk of bias summary; and (b) overall assessment of risk of bias

showed that the most common mental disorder in IHD patients was depression, which is consistent with previous studies.[30] Depression and anxiety can be contributing factors for cardiac disease, and untreated depression, similar to cigarette smoking and hypertension, can increase the risk of coronary heart disease.[31]

Past studies have shown that psychiatric factors such as depression and anxiety are associated with unfavorable prognoses.[32] Other influencing factors include a history of glycemic control in diabetic patients.[33] It has also been shown that better management of psychosomatic comorbidities in IHD patients can improve their sleep health.[34] Follow-up and treatment of mental disorders have been shown to improve patient outcomes.[35]

This study showed that the prevalence of psychiatric disorders in patients with IHD was increasing over time. One of the reasons for this finding was the increased

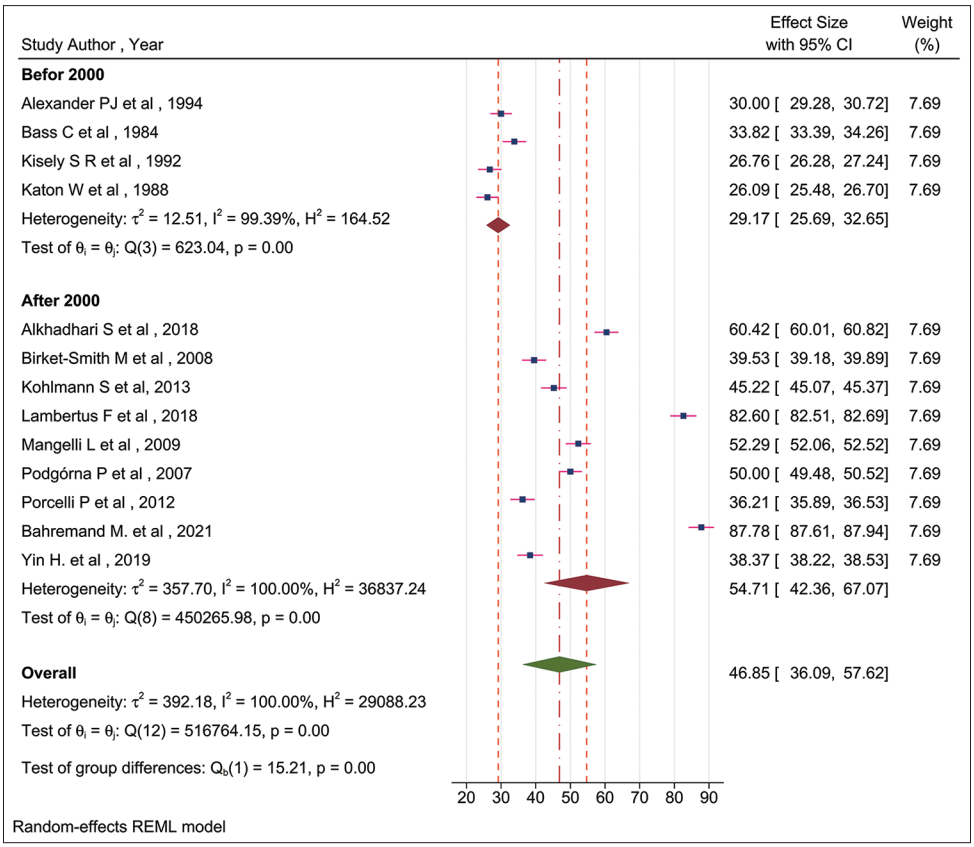

Figure 2: The forest plot for the prevalence of psychiatric disorders in patients with ischemic heart disease. The squares and horizontal lines correspond to the prevalence and 95% confidence interval, respectively. The diamond represents the pooled prevalence

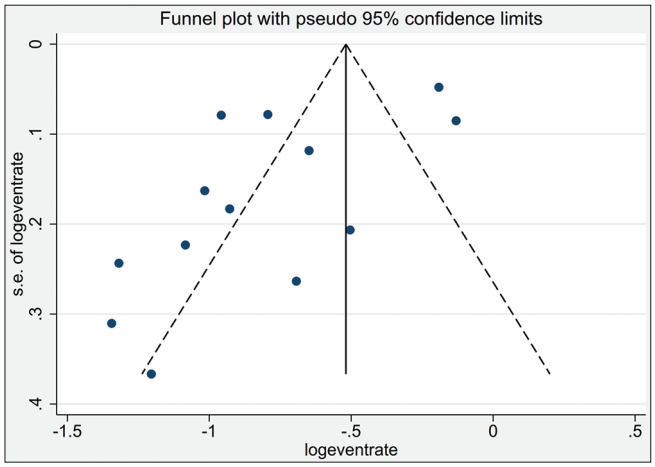

Figure 3: The funnel plot of publication bias for the prevalence of psychiatric disorders in patients with ischemic heart disease

evaluation and identification of these disorders in patients. Furthermore, increasing the total number of IHD patients can be effective. Considering our findings, mental comorbidities should be monitored and treated regularly in patients with myocardial ischemia.

Limitations

This study had some limitations. First, there were some differences in the experimental design of the included studies. Second, the trials were performed in different settings on different patient populations (i.e., outpatients vs. inpatients), and the variables were not measured in a similar manner. Differences in studies have limited us to analyzing the correlation between prevalence and other factors, such as socioeconomic factors, comorbidities, or mortality. Third, no data were available from African countries. Therefore, the results cannot be generalized. Finally, we found potential sources of publication bias in the extracted studies, possibly arising from language bias, citation bias, multiple publications, selective reporting of outcomes, and inadequate data analysis.

CONCLUSION

The prevalence of psychiatric diseases in people with ischemic chest pain is high and increases over time; therefore, it is recommended that preventive measures should be taken worldwide. Depression is the most common disorder among IHD patients. Since no screening has been conducted in many African countries, and no information is available regarding the prevalence of psychiatric disorders, it is recommended to determine and compare the prevalence of psychiatric disorders in these regions with different parts of the world in epidemiological studies.

Acknowledgments

This article has been extracted from the thesis written by Mr. Mohamad Mehdi Derisi (Registration No: 399) from Shahid Beheshti University of Medical Sciences. The Ethics Committee of Shahid Beheshti University of Medical Sciences approved the study (Approval ID: IR.SBMU.MSP.REC.1397.642).

Financial support and sponsorship

This article has been extracted from the thesis written by Mr. Mohamad Mehdi Derisi (Registration No: 399) from Shahid Beheshti University of Medical Sciences.

Conflicts of interest

There are no conflicts of interest.

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Table S1: The search strategy

Database	Query	Results	Date
Medline and PubMed	Search (((“Myocardial Ischemia”[Mesh]) OR (“Myocardial Ischemia”[Title/Abstract]) OR (“Ischemic Heart Disease”[Title/Abstract]) OR (“Ischemias, Myocardial”[Title/Abstract]) OR (“Disease, Ischemic Heart”[Title/Abstract])) AND ((“Psychophysiologic Disorders”[MeSH Terms]) OR (“Psychophysiologic Disorder”[Title/Abstract]) OR (“Psychosomatic Disorders”[Title/Abstract]) OR (“Psychosomatic Disorder”[Title/Abstract]) OR (“Psychophysiological Disorders”[Title/Abstract]) OR (“Psychophysiological Disorder”[Title/Abstract])))	497	June 6, 2021
Embase	7 #3 AND #6	982	June 6, 2021
	6 #4 OR #5	48,175	June 6, 2021
	5 “Psychosomatic disorder”:ti,ab OR “Psychoorganic Syndrome”:ti,ab OR “Psychoautonomic Syndrome”:ti,ab OR “Psychoorganic Syndrome”:ti,ab OR “Psychophysiologic Disorders”:ti,ab OR “Psychosomatic Disturbance”:ti,ab OR “Psychosomatosis”:ti,ab OR “Somatopsychic Syndrome”:ti,ab	720	June 6, 2021
	4 “Psychosomatic disorder”/exp	47,802	June 6, 2021
	3 #1 OR #2	854,079	June 6, 2021
	2 “Ischemic Heart Disease”:ti,ab OR “Coronary Artery Insufficiency”:ti,ab OR “Coronary Artery Occlusive Disease”:ti,ab OR “Coronary Heart Disease”:ti,ab OR “Heart Disease”:ti,ab OR “Ischemic Cardiac Disease”:ti,ab OR “Ischemic Cardiomyopathy”:ti,ab	233,984	June 6, 2021
	1 “Ischemic heart disease”/exp	720,419	June 6, 2021
ISI-WoS	3 #2 AND #1 Indexes=SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years	193	June 6, 2021
	2 TS=(“Ischemic Heart Disease” OR “Coronary Artery Insufficiency” OR “Coronary Artery Occlusive Disease” OR “Coronary Heart Disease” OR “Heart Disease” OR “Ischemic Cardiac Disease” OR “Ischemic Cardiomyopathy” OR “Myocardial Ischemia”)	511,551	June 6, 2021
	1 TS=(“Psychosomatic Disorder” OR “Psychoorganic Syndrome” OR “Psychoautonomic Syndrome” OR “Psychoorganic Syndrome” OR “Psychophysiologic Disorders” OR “Psychosomatic Disturbance” OR “Psychosomatosis” OR “Somatopsychic Syndrome”)	4746	June 6, 2021

CPCI-SSH=Citation index–social sciences and humanities; CPCI-S=Conference proceedings citation index-science; SCI-EXPANDED=Science citation index expanded; SSCI=Social sciences citation index; ESCI=Emerging sources citation index

Table S2: Quality assessment of articles based on the Joanna Briggs Institute model

First author	Year	Was the sample representative of the target population?	Were the study participants recruited in an appropriate way?	Was the sample size adequate?	Were the study subjects and the setting described in detail?	Was the data analysis conducted with sufficient coverage of the identified sample?	Were objective, standard criteria used for the measurement of the condition?	Was the condition measured reliably?	Was there an appropriate statistical analysis?	Was the response rate adequate, and if not, was the low response rate managed appropriately?	Quality
Alexander, P. J.	1994	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Alkhadhari, S.	2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Bass, C.	1984	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Birket-Smith, M.	2008	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Good
Kisely, S.R.	1992	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Kohlmann, S.	2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Lambertus, F.	2018	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Mangelli, L.	2009	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	High
Podgórna, P.	2007	Unclear	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Good
Porcelli, P.	2012	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	High
Katon, W.	1988	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	High
Bahremand, M.	2021	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Yin, H.	2019	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High