Systematic Review

Shivani Mandrekar, Prem Venkatesan* and Ravishankar Nagaraja

Prevalence of musculoskeletal chest pain in the emergency department: a systematic review and meta-analysis

https://doi.org/10.1515/sjpain-2020-0168
Received November 7, 2020; accepted March 21, 2021;
published online April 12, 2021

Abstract

Objectives: Our objective was to systematically review and meta-analyse relevant studies to determine the prevalence of musculoskeletal chest pain in the emergency department.

Methods: This review was constructed while confirming to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. PubMed, Cochrane Library, SCOPUS, Science Direct, and OVID were systematically searched from their inception to January 19, 2020, to identify observational studies, where the prevalence of musculoskeletal causes of chest pain was reported in isolation or in combination with other causes or could be calculated from the available data.

Results: A meta-analysis of the nine included studies, having a total of 14,743 participants, showed the global pooled prevalence of musculoskeletal chest pain in the emergency department to be 16% (10–22%) [I^2=99.24%]. The pooled prevalence for the European continent was 17% (9–25%) [I^2=99.51%] and that for the urban areas was 13% (7–19%) [I^2=99.00%].

Conclusions: This review provides a reliable estimate of the prevalence of musculoskeletal chest pain in the emergency department. More studies providing age and gender-specific data for the prevalence of musculoskeletal chest pain in the emergency department should be carried out. A paucity of such data from rural areas also needs to be addressed in future research work. The prevalence values from this study will be useful in the application of Bayesian reasoning utilised in diagnosing patients, where the process of Bayesian arguing begins by knowing pre-test probabilities of different differential diagnosis, in this case that of musculoskeletal chest pain in the emergency department.

Keywords: chest pain; emergency service, hospital; meta-analysis; musculoskeletal chest pain; prevalence; systematic review.

Introduction

Chest pain has repeatedly been ranked amongst the top five disease-related groups [1], with an estimated lifetime prevalence of around 20–40% in the general population [2]. It is a common presentation in the emergency department (ED), accounting for 5–12% of all ED admissions [3]. As per the reports of the Centre for Disease Control and Prevention, in the United States of America alone, more than seven million patients are evaluated in the emergency departments for complaints of chest pain each year [4]. In England, this accounts for 4.5% of the total ED admissions [5].

Chest pain is a symptom and not a disease, and therefore can be attributed to a variety of causes for its occurrence [6]. It may indicate an acute, life-threatening cardiovascular cause, such as acute myocardial infarction, unstable angina, pulmonary thromboembolism, aortic dissection, or pericardial tamponade [7]. However, acute myocardial ischemia can be ruled out for almost 60–90% of patients using a thorough diagnostic work-up [8], who then fall under the category of non-cardiac chest pain (NCCP). In the US, the percentage of patients presenting to the ED with non-specific chest pain, has increased by 13% from 2006 to 2011 [9].

Chest pain due to non-cardiac causes can be attributed to underlying musculoskeletal, pulmonary, gastro-intestinal, psychological, infectious, or drug-related disorders [7]. A

***Corresponding author: Prem Venkatesan**, Associate Professor – Senior Scale and HOD, Department of Physiotherapy, Manipal College of Health Professions, Manipal Academy of Higher Education, Bengaluru-560017, Karnataka, India, E-mail: prem.v@manipal.edu
Shivani Mandrekar, Department of Physiotherapy, Manipal College of Health Professions, Manipal Academy of Higher Education, Bengaluru, Karnataka, India
Ravishankar Nagaraja, Department of Biostatistics, Vallabhbhai Patel Chest Institute, University of Delhi, New Delhi, India

meta-analysis aimed at studying chest pain in the general practice reported that chest wall syndrome accounts for 24.5–49.8% of all chest pain complaints [10]. However, there is a paucity of systematic reviews synthesizing the available evidence on the prevalence of NCCP in the ED. This systematic review aims to study the prevalence of musculoskeletal chest pain (MSCP) in the ED.

Methods

This review was constructed while conforming to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [11].

Eligibility criteria

Our review compiles published observational studies, where the prevalence of MSCP was reported in isolation or in combination with other causes or could be calculated from the available data. We included studies if a. the study design was cross-sectional, cohort, or case control; b. the study setting was the ED; and c. the age of the participants was 18 years or more. The language of the included texts was restricted to English. We excluded case reports, case series, intervention studies, and studies on specific populations (women, athletes, soldiers).

Information sources and search strategies

A thorough and systematic literature search was implemented to extract observational studies providing prevalence of MSCP in the ED. The electronic databases of Cochrane Library, PubMed, SCOPUS, Science Direct, and OVID were searched from inception to January 19, 2020. Two criterion components of the search strategy, (1) population and (2) outcome, were combined using Boolean Operator "AND" (Table 1) to identify publications of choice. The terms used for Population included: "non-cardiac chest pain", "noncardiac chest pain", "NCCP", "non-specific chest pain", "chest pain". Outcome search terms included were: "musculoskeletal", "muscular", "orthopaedic", "orthopedic", "musculoskeletal chest pain", "chest wall pain", "chest wall syndrome", "cervicothoracic angina", "cervical angina", "musculoskeletal chest wall pain". Studies excluding human participants were filtered out during the search.

Study selection

The search results from all five databases were first exported to EndNote X7.8, and the duplicates were removed. The two authors (SM and VP) then independently screened the titles and the abstracts, to eliminate the studies that did not fulfil the pre-determined inclusion and exclusion criteria. The full texts of the studies conforming to the requirements were then retrieved and reviewed for eligibility. Discussions with the third author (RN) helped to resolve any discrepancies.

Data collection process and items

Consistency and accuracy in the data extraction process were maintained by the provision of electronic data forms and an instruction manual to the two reviewers (SM and VP). Both reviewers independently collected the relevant data from each study. The data of interest included the year of publication, geographical location of the study, study design, characteristics of the participants (including age and gender), sample size, methodology, outcome measure, frequency of MSCP, and frequency of independent causes of MSCP.

Table 1: Keywords used to identify relevant articles from all electronic databases.

PICO	Search strategy
Target population	(((((((“non-cardiac chest pain”) OR (“noncardiac chest pain”)) OR (“non cardiac chest pain”)) OR (“NCCP”)) OR (“nccp”)) OR (“non-specific chest pain”)) OR (“non specific chest pain”)) OR (“chest pain”)
	AND
Outcome	(((((((((“musculoskeletal”) OR (“muscular”)) OR (“orthopaedic”)) OR (“orthopedic”)) OR (“musculoskeletal chest pain”)) OR (“chest wall pain”)) OR (“chest wall syndrome”)) OR (“cervicothoracic angina”)) OR (“cervical angina”)) OR (“musculoskeletal chest wall pain”)

Quality assessment

The two reviewers (SM and VP) independently analysed the quality of all the included studies, and any conflicts were resolved by discussions with the third reviewer (RN). The "US National Heart, Lung, and Blood Institute (NIH) checklist for observational cohort and cross-sectional studies" (Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies) was utilised for this purpose [12]. Out of

Table 2.1: Quality assessment of included cross-sectional studies using NIH quality assessment tool for observational cohort and cross-sectional studies.

Author [Reference number]	Q1	Q2	Q3	Q4	Q5	Q11	Final score (out of 6)	Quality
Karlson et al. [15]	Y	Y	NR	N	N	N	2	Poor
Buntix et al. [16]	Y	N	N/A	Y	N	N	2	Poor
Knockaert et al. [17]	Y	Y	N/A	Y	N	Y	4	Fair
Parkash et al. [19]	Y	Y	Y	Y	CD	Y	5	Fair
Cilia et al. [18]	Y	Y	Y	N	N	Y	4	Fair
Geyser et al. [20]	Y	Y	Y	N	N	N	3	Fair
Bjørnsen et al. [3]	Y	Y	Y	Y	N	N	4	Fair
Wertli et al. [8]	Y	Y	Y	Y	N	Y	5	Fair

NR, Not Reported; NA, Not Applicable; CD, Cannot Determine.

Table 2.2: Quality assessment of included cohort study using NIH quality assessment tool for observational cohort and cross-sectional studies.

Author [Reference number]	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Final score (out of 6)	Quality
Roche et al. [1]	Y	Y	N/A	Y	N	N	CD	N	N	N	N	N	N	N	3	Poor

NR, Not Reported; NA, Not Applicable; CD, Cannot Determine.

all the 14 questions, only questions 1, 2, 3, 4, 5, and 11 were relevant for cross-sectional studies, and the remaining eight questions, pertinent to cohort studies, were marked as not applicable (NA). Each question was scored as Yes, No, or Others (Cannot Determine [CD], Not Applicable [NA], Not Reported [NR]). A study with 6 Yes responses was considered "Good" quality, 4–5 Yes responses as "Fair" quality, and less than 4 Yes responses as "Poor" quality [13] (Table 2.1). All 14 questions were considered while analysing cohort studies, with a score of 13–14 indicating good, 9–12 as fair, and less than 12 a poor-quality study [14] (Table 2.2).

Data synthesis and statistical analysis

We performed a meta-analysis to obtain the overall estimate of prevalence of MSCP in the ED. As the studies included in this review were mostly observational, the random effects model was used for the meta-analysis. The chi-square statistic and *I*-squared statistic were used as measures of heterogeneity. The "Metaprop" package within the STATA 13.1 software, was used to perform the meta-analysis. Forest plots have been reported to depict the meta-analysis, where the diamond depicts pooled estimate with a 95% confidence interval.

Results

Study selection

The pre-determined search strategy returned 1,286 studies from the electronic databases, out of which 196 duplicates were removed (Figure 1). Nine hundred and sixty-four studies were excluded from screening the titles, and 90 studies were excluded from the abstract screening. The full texts of 36 articles were potentially eligible for inclusion. Twenty-seven records were excluded based on study design, unclear study setting, language other than English, unavailability of full texts, lack of identification of participants with musculoskeletal chest pain, and studies which had not included all the chest pain patients reporting to the ED. A final count of nine studies [1, 3, 8, 15–20] that fulfilled the inclusion criteria was selected for the systematic review.

Study characteristics

All the included studies were cross-sectional, with one study being of cohort study design. We were unable to identify any relevant case-control studies that fulfilled the inclusion criteria. Six studies were conducted in Europe [3, 8, 15–18], one in Asia [19], one in Australia [1], and one in South Africa [20], between 1991 and 2020. All the researches were conducted in the emergency department with seven studies including patients with chest pain [1, 3, 16–20], one study including patients with symptoms indicative of acute coronary syndrome [15], and one study recruiting patients with non-cardiac diagnosis during discharge from the ED [8]. The study duration varied widely amongst the researches, with the shortest being three months [1] and the longest being three years [8].

The total participants included in all studies were 14,743, with the smallest sample size being 202 [19] and the largest having 7,157 participants [15]. A high male to female ratio was reported across all the studies. The minimum age of the participants was 16 years, with the oldest recorded participant being 101 years old [15]. The inclusion criteria remained uniform across the studies, with two studies not reporting their criteria for inclusion of participants [15, 18]. The participants excluded were those with a history of trauma, presence of any life-threatening conditions, children, pregnant women, inflammatory joint diseases, fibromyalgia, dementia, inability to cooperate, refusal to participate, participants who bypassed the ED, and those who were referred from another hospital or referred directly to the surgical department or the cardiology clinic. Three studies did not report any exclusion criteria [17, 18, 20].

Quality assessment

Usage of the "Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies" identified three cross-sectional studies and the single cohort study as poor quality and demonstrated the remaining five cross-sectional studies to be of fair quality (Tables 2.1 and 2.2). The majority of the studies scored fair due to the lack of a sample size justification, and poorly defined and implemented outcome measures. The studies that further did not report their criteria for inclusion and exclusion, and the participation rate of eligible individuals received a poor overall score.

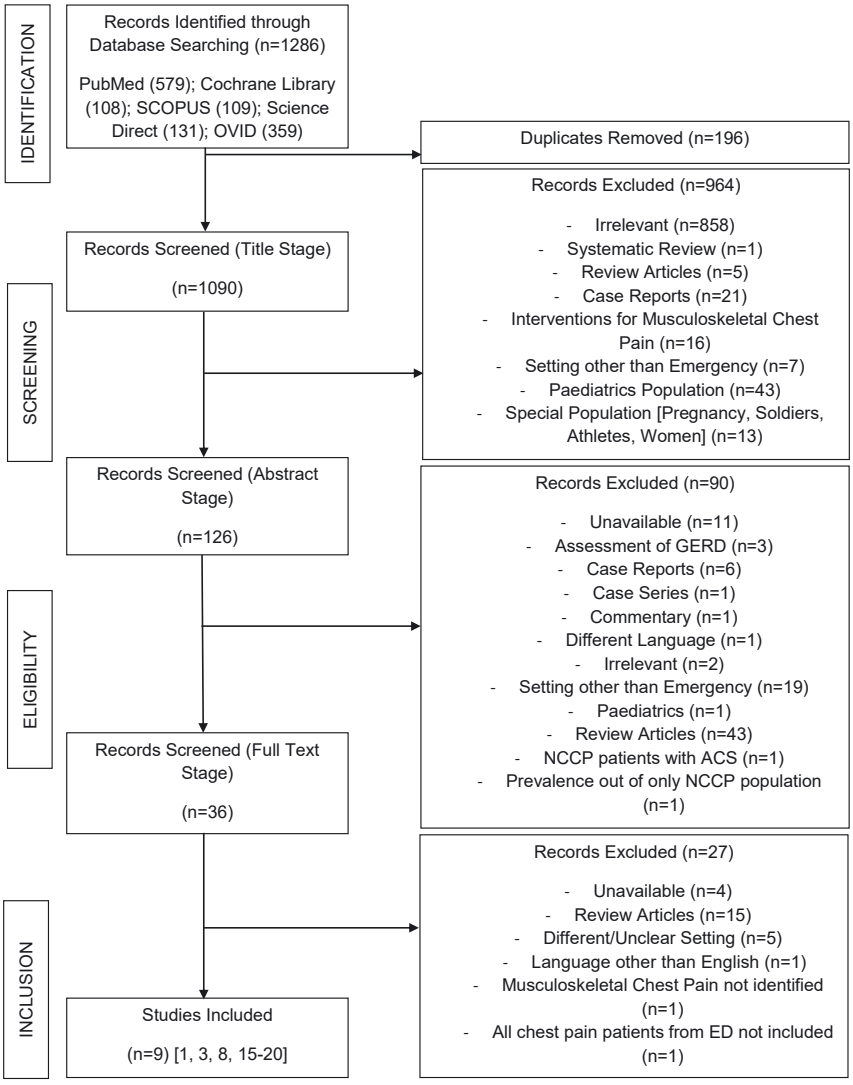

Figure 1: Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow chart illustrating identification of relevant articles.

Global prevalence of MSCP in the ED

The majority of the studies were conducted within the European continent, and there was a scarcity of data from South Asia, Australia, and South Africa, with no identified researches from North America, South America, and Central Asia. The highest prevalence of 49% was reported in Italy [18], and the lowest of 4.36% in Norway [3]. The calculated value for the worldwide pooled prevalence of MSCP in the ED was 16% (10–22%) with a 95% confidence interval (Figure 2).

Four studies further classified MSCP into individual conditions including costochondritis (3–11.43%) [1, 20], rib sprain/strain (3.3%) [1], trauma (9.09%) [20], myalgia (2%) [3], non-specific diagnosis related to chest wall (90%), non-specific diagnosis related to spine (3%) [8], fractured rib (0.83%) [8], late onset rheumatoid arthritis (0.17%) [8], and contusions (0.50%) [8].

A significant lack of data with respect to age and gender was identified, with only one study [15] reporting age and gender-specific prevalence values for MSCP in the ED. Amongst the male participants, 32% between ages 16–34 years, 24% between ages 35–49 years, 23% between ages 50–66 years, and 18% between ages 67–101 years, were classified under the category of MSCP. A similar analysis amongst females revealed 32, 32, 33, and 18% prevalence of MSCP within the same age groups, respectively. Another study [8], reported that within the patients identified with MSCP the median age was 40.5 years [IQR 30–55].

A study from Belgium [17], reported prevalence by categorising patients with chest pain due to musculoskeletal pathology as either being self-referred (9.3%), referred by a physician (6.8%), or being brought in an ambulance to the ED (2.1%).

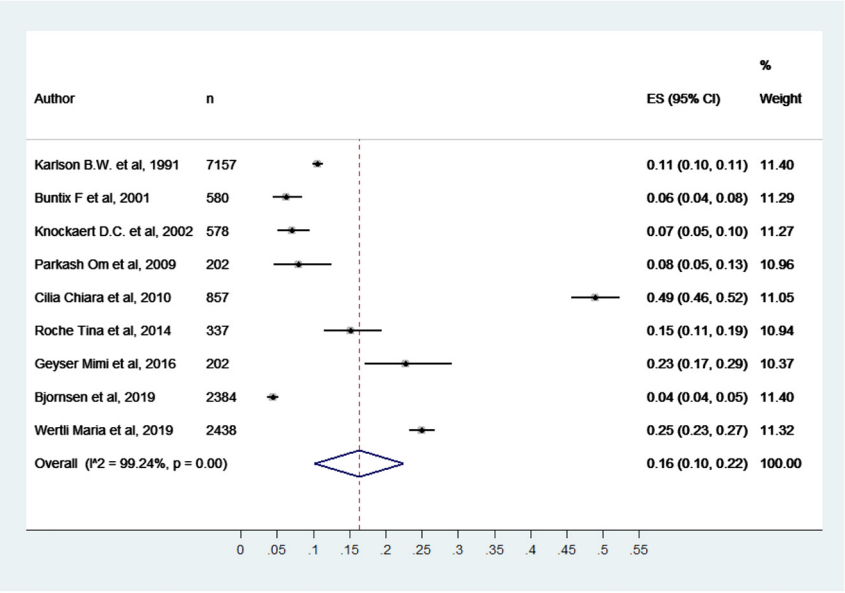

Figure 2: Forest plot showing the global pooled prevalence of musculoskeletal chest pain in the emergency department.

Table 3 summarises the characteristics of all the nine included studies. We found a high value of I^2 (99.24%), indicating substantial heterogeneity across the studies.

Prevalence of MSCP in the European continent

Six studies were conducted in Europe from 1991 to 2020, that reported the prevalence of MSCP in the ED. Two studies from Belgium [16, 17], and one each from Sweden [15], Italy [18], Norway [3], and Switzerland [8] were reviewed and included in the analysis. The statistics for the highest and lowest prevalence coincide with those seen at the global level. The pooled prevalence of the compiled number of 13,994 participants from the European continent was calculated to be 17% (9–25%), with a heterogeneity of 99.51% (Figure 3).

Prevalence of MSCP in urban areas

A total of six studies reported prevalence values from the EDs located in urban areas including Goteborg, Sweden [15]; Leuven, Belgium [17]; Karachi, Pakistan [19]; Pretoria, South Africa [20]; Trondheim, Norway [3]; and Winterthur, Switzerland [8], and were analysed as a separate sub-group. The lowest prevalence was recorded in Trondheim (4.36%), with the highest seen in Winterthur (25%). A pooled prevalence of 13% with a confidence interval of 7–19% (I^2=99.00%) was calculated from a total urban population of 12,961 (Figure 4).

Discussion

This systematic review identified nine relevant research articles published between 1991 and 2020, which reported or provided enough data to calculate the prevalence of MSCP in the ED. We performed a meta-analysis and demonstrated the worldwide pooled prevalence to be 16% (10–22%). The subgroup analysis to calculate the pooled prevalence within the European continent demonstrated a value of 17% (9–25%). Out of the nine researches included in our review, six researches were identified from Europe, which could explain the similarity of the worldwide prevalence to that of the calculated prevalence value of the European continent.

The incidence and clinical pattern of diseases are known to vary from one region to the other [21]. The existing literature demonstrates the prevalence of musculoskeletal disorders in the urban areas to be variable from that seen in the rural areas. These variations are due to differences in physical and psychological demands in daily life, occupation, educational level, access to technology, and social support [22–25]. Thoracic spine pain from segmental dysfunction, which is a common cause of musculoskeletal chest pain, has also been shown to be associated with lifestyle, social, psychological, environmental, and occupational factors [26–28]. Therefore, a difference in the prevalence of MSCP in the urban and rural areas is expected. We performed a sub-group analysis of six studies reporting data from emergencies located in urban areas and identified the pooled prevalence to be 13% (7–19%). We could not perform a similar analysis for rural areas due to the unavailability of enough data. The rural emergency departments have been facing challenges

Table 3: Characteristics of studies included in the review.

Author [Reference number]	Country	Study design	Study population	Study duration, months	Sample size	Age, years/Mean (SD)/Median [Q1, Q3]	Methodology	Outcome measures	Musculoskeletal chest pain prevalence, %	
									Overall	Individual conditions
Karlson et al. [15]	Sweden	Prospective cross-sectional	Chest pain or symptoms indicative of myocardial infarction	21	7,157	16–101	Diagnosed by a physician based on history, physical examination, and 12-Lead ECG	ECG	10.58	NR
Buntix et al. [16]	Belgium	Cross-sectional	Chest pain	7	580	60 (18)	Final diagnosis based upon all information available from questionnaires filled by physicians and available test results	NR	6.20	NR
Knockaert et al. [17]	Belgium	Prospective cross-sectional	Chest pain	7	578	60.1 (17.9)	Initial diagnosis by attending resident based on full history taking, complete physical examination, ECG, initial laboratory tests, and chest radiograph. Final diagnosis post-discharge based on clinical records and discharge notes	Routine laboratory tests, ABG, D-dimers, cardiac enzymes, ECG, chest radiograph, lung scintillography, echocardiography, exercise test, esophagogastroscopy	7.10	NR
Parkash et al. [19]	Karachi	Analytic cross-sectional	Acute chest pain	8	202	ACS group: 59.3 (12), NCCP group: 50.6 (12)	Demographics and comorbidities, initial assessment of the cardiology resident (based on the character of chest pain, electrocardiograph, troponin I), cardiovascular clinical exam, the final assessment of ACS and NCCP based on the cardiac work-up	ECG, troponin 1, pulse, B.P.	7.92	NR
Cilia et al. [18]	Italy	Cross-sectional	Chest pain	6	857	58 (17)	Diagnosis based on clinical evaluation and findings from outcome measurements	Systolic BP, diastolic BP, heart rate, SpO_2, ECG, cardiac enzymes, and chest X-ray	49	NR
Roche et al. [1]	Australia	Retrospective observational cohort	Undifferentiated chest pain patients	3	337	18–92	Data regarding age, gender, time to treatment, arrival and discharge	NR	15	Costochondritis (3%), rib sprain/strain (3.3%)

Table 3: (continued)

Author [Reference number]	Country	Study design	Study population	Study duration, months	Sample size	Age, years/Mean (SD)/Median [Q1, Q3]	Methodology	Outcome measures	Musculoskeletal chest pain prevalence, %	
									Overall	Individual conditions
							times, waiting times, discharge diagnosis, unplanned representations collected from records			
Geyser et al. [20]	South Africa	Retrospective descriptive study	Chest pain	5	210	≥18	Records were assessed and data collected on patient demographics and disposition from the ED	NR	21.90	Costochondritis: 11.43%, trauma: 9.09%, other: 1.44%
Bjørnsen et al. [3]	Norway	Cross-sectional	Chest pain	12	2,384	61 (18)	Patient data were retrieved from the hospital's patient and administrative system, containing all hospital activity and linked with the local ED database containing logistic data on patients referred to the ED	NR	4.36	Myalgia (2%)
Wertli et al. [8]	Switzerland	Single centre, retrospective medical chart review	Non-cardiac diagnosis during discharge from the ED	36	2,438	46 [33.0, 60.0]	General characteristics, cardiovascular risk factors, signs and symptoms, medications, comorbidities, and clinical findings were extracted from the records of patients	Blood analysis, ECG, imagining studies, coronary angiography, non-invasive testing (treadmill testing, cardiac scintillography, echocardiography)	25	Non-specific related to chest wall (90%), non-specific related to spine (3%), fractured rib (0.83%), late onset rheumatoid arthritis (0.17%), contusion (0.50%)

ECG, Electrocardiogram; NR, Not Reported; ABG, Arterial Blood Gas; ACS, Acute Coronary Syndrome; NCCP, Non-Cardiac Chest Pain; BP, Blood Pressure; SpO_2, Blood Oxygen Saturation; ED, Emergency Department.

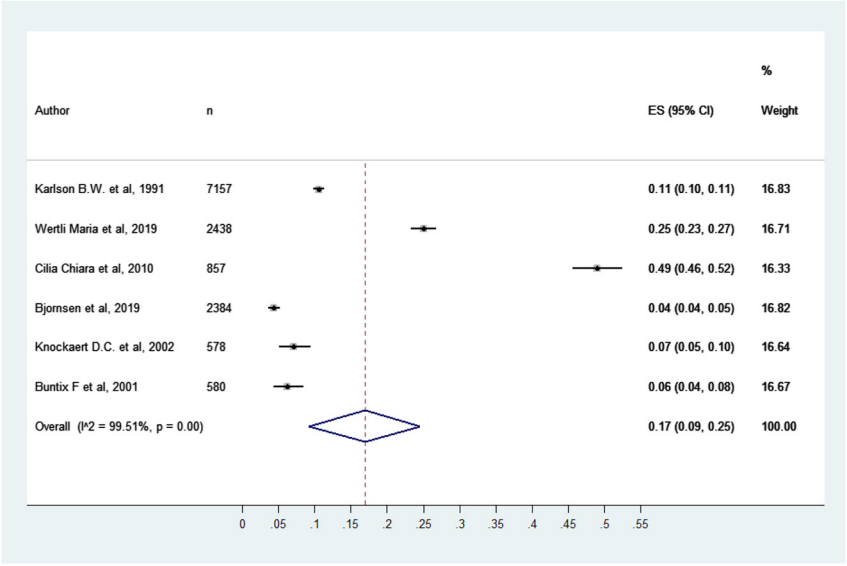

Figure 3: Forest plot showing the pooled prevalence of musculoskeletal chest pain in the emergency department in the European continent.

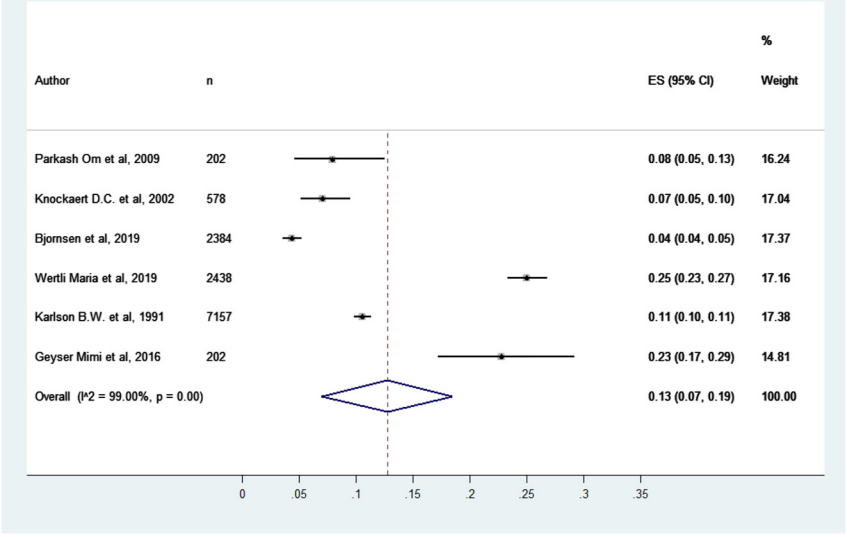

Figure 4: Forest plot showing the pooled prevalence of musculoskeletal chest pain in the emergency department in the urban areas.

with providing accessible, efficient, and quality services due to overcrowding, shortage of staff, limited access to specialists, inadequate infrastructure, throughput, and uncompensated healthcare amongst others [29–31]. With the rural emergency department visits increasing by more than 50% in the past 12 years [32], acquiring such prevalence data is one of the crucial steps towards improving healthcare delivery in rural EDs.

The included studies were of cross-sectional and cohort study design which explains the substantial heterogeneity identified. The diagnosis of NCCP was confirmed after the exclusion of a cardiac cause of chest pain. Cardiac chest pain was diagnosed using electrocardiography [8, 15, 17–20], cardiac enzymes [8, 17–20], chest radiograph [8, 17, 18, 20], echocardiography [8, 17], exercise tolerance test [8, 17, 19], dobutamine stress echocardiography [19], coronary angiography [8, 19], myocardial perfusion scan [19], heart rate [8, 18, 19], oxygen saturation [8, 18], and blood pressure [8, 18, 19]. The methods used for diagnosing MSCP were chest wall tenderness on palpation [17, 19, 20], pain worsening by torsion of the chest [17], and exclusion of other causes of NCCP [19, 20]. Torsion of the chest was performed by a strong rotational twist of the chest, with the patient in a sitting position. This manoeuvre causes a strain on the ribs and the dorsal column and is positive in case of a rib contusion or a muscular problem [17]. In two studies, the clinical diagnosis made by the general practitioner or an emergency physician was used to identify patients with MSCP, while the physical examination procedures for diagnosis were not reported [15, 16]. Three studies derived

the diagnosis from the hospital administrative systems [3], discharge diagnosis and medical records [8], and emergency department information systems [1]. We tried contacting the authors regarding methodological clarity, but the details about the physical examination remain unclear in six studies [1, 3, 8, 15, 16, 18].

Pulmonary causes of chest pain were diagnosed and excluded based on history of previous lung disease [18], chest radiograph [17–20], transcutaneous peripheral oxygen saturation [18], lung scintillography [17], and arterial blood gas levels [17]. The pulmonary causes diagnosed included pneumonia [20], pulmonary tuberculosis [20], and hyperventilation syndrome [17]. The diagnosis of hyperventilation syndrome was indicated by dizziness, trembling, stiff muscles, perioral and acral paraesthesia, and changes in arterial blood gas levels [17]. The diagnosis of pulmonary causes of chest pain was made by a general practitioner in two studies [15, 16]. Peptic diseases like oesophagitis were diagnosed using oesophagogastroscopy [17]. When patients expressed a major concern or fear for cardiac disease, a clinical judgement and evaluation by a psychiatrist led to the diagnosis of psychiatric chest pain [17, 18]. This included a diagnosis of anxiety disorder and panic attack [17].

None of the included studies justified the chosen sample size, and this factor, combined with unclear outcome measures, could be the reason for six studies [3, 8, 17–20] scoring "Fair" on the quality assessment. Three studies [15, 18, 20], did not specify the inclusion and exclusion criteria for selecting their participants. In addition to the above factors, one study [15] provided limited details regarding the participation rate of the eligible persons, while for two studies [1, 16], this question was not applicable due to the usage of medical discharge records. This could explain the "Poor" total score calculated for these studies [1, 15, 16]. The objectives of the research paper and the included sample population were clearly defined in all the studies.

Our study has several strengths. Our study is the first that has systematically reviewed and summarised the available data on the prevalence of MSCP in the ED. We included all eligible articles over an extensive period of 29 years from 1991 to 2020. The methodological strengths of this review are, firstly, we carried out a comprehensive and rigorous literature search of the electronic databases. Secondly, two independent investigators carried out the eligibility assessment, data extraction, and quality evaluation, with all discrepancies resolved by the third investigator. Thirdly, we utilized the predefined PRISMA guidelines for reporting our systematic review. Fourthly, we quantitatively analysed the relevant data by performing a valid meta-analysis and two sub-group analysis based on the continent and geographical area. When viewed individually, studies may not produce reliable estimates of prevalence. However, pooling multiple studies makes it possible to estimate associations with greater precision, while making regional variations more evident. A meta-analysis of observational studies, therefore, helps to quantitatively evaluate the global burden of the disease and to combine estimates from different regions with similar characteristics [33]. The findings from this study will be useful in the application of Bayesian or probabilistic reasoning utilised by clinicians in diagnosing patients where the process of Bayesian arguing begins by knowing pre-test probabilities of different differential diagnosis [34].

The limitation of our study is that we only included articles published in the English language. Furthermore, we were unable to provide a prevalence value for rural emergency departments due to the scarcity of literature. Lastly, the majority of the researches included in this review were from Europe, which may have influenced the global pooled prevalence value. Studies from other continents need to be undertaken in the future to provide a more accurate global picture.

Our review has identified certain implications for future research. Good quality researches, providing prevalence values, need to be carried out in more countries, especially from North America, South America, and Central Asia, where currently such data is unavailable. Such research will assist in providing an accurate assessment of true global prevalence. Similar studies are also encouraged in the rural setting where a variation in prevalence is expected. There is a paucity of age and gender-specific data for the prevalence of MSCP in the ED. The current literature also lacks prevalence values for the individual conditions causing MSCP, which could be the scope for future studies. Finally, prevalence can also be calculated by categorising patients as self-referred, referred, or brought by an ambulance, as the diagnostic case-mix varies in these situations, and scarcity of data exists within this area.

Conclusions

Based on the limited and low-quality evidence this systematic review concludes the global pooled prevalence of MSCP in the ED to be 16% (10–22%). The prevalence value for the European continent is 17% (9–25%), and that for the urban areas is 13% (7–19%).

Acknowledgment: We extend our sincere gratitude to Ms. Sachika Rautela for providing her valuable assistance in the grammatical and language editing of our paper.
Research funding: Authors state no funding involved.

Author contributions: All authors have accepted responsibility for the entire content of this manuscript and approved its submission.
Competing interests: Authors state no conflict of interest.
Informed consent: Not applicable.
Ethical approval: Not applicable.

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