Common Causes of Chest Pain in the Emergency Department of Orotta National Referral Hospital, Asmara, Eritrea

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Abstract

Background

Chest pain is one of the common causes of visits to the emergency department. However, there is scarcity of studies on the causes and prevalence of this common symptom in Eritrea. This retrospective descriptive study was done to determine the prevalence, causes, clinical features, demographics, diagnostic modality and outcome of all patients with the chief complaint of chest pain who presented to the ED of Orotta national referral hospital in Eritrea and the association of demographic characters, diagnostic modality, and clinical features with final diagnosis and outcome.

Methods

After securing approval by Ministry of Health ethical and research committee, Clinical Service Division and from Orotta National Referral Hospital in Asmara Eritrea, Records of patients 15 years and older presenting with the complaint of chest pain from 1st January 2018 through 31st December 2018 were assessed. Samples of patients who presented with chest pain and did ECG were also included. All data were collected in Microsoft excel software, cleaned and then analyzed using Statistical Package of Social Sciences (SPSS) software version 20.

Results

855 patients presented with chest pain to the emergency department, out of which 798 patient files were retrieved. Respiratory disease was the most common cause 441(51.6%), with pneumonia the most common diagnosis 415 (94.1%) followed by cardiac cause at 234(27.4%).Out of the study population 253 study sample were taken with inclusion criteria of those who did an ECG. In these study samples the most common cause was cardiovascular 149(58.9%) out of which the most common illness was ST elevation myocardial infarction 60(23.7%). Out of 253 patients who did electrocardiogram 230(90.9%) were discharged and 23(9.1%) died. 6(26%) of those who died were smokers and 13(56.5%) of those who died were above 69 years old.

Conclusion

The main cause of chest pain was found to be respiratory disease, followed by cardiovascular disease in the population study, which was reversed in the sample study (those who did ECG). Age and Smoking were found to affect the prognosis. There were highest mortality rates in STEMI and pulmonary embolism.

Background

Chest pain is one of the common reasons for patients' visits to the emergency department. It is defined as an unpleasant sensation localized to the chest, which can present as squeezing burning, clawing, and tearing sensation among others. etc[1]. The evaluation of non traumatic chest discomfort is inherently

challenging owing to the broad variety of possible causes, a minority of which are life-threatening conditions that should not be missed[1].

Chest discomfort is the second most common reason for visits to the ED, resulting in 6 to 7 million emergency visits each year in the USA[8, 12]. More than 60% of patients with this presentation are hospitalized for further testing, and the rest undergo additional investigation in the ED[1]. Fewer than 25% of evaluated patients are eventually diagnosed with acute coronary syndrome (ACS), with rates of 5–15% in most series of unselected populations[1]. In the remainder, the most common diagnoses are gastrointestinal causes, and fewer than 10% are other life-threatening cardiopulmonary conditions[1].

Once a patient presents with such complaint, the first priority is to consider potentially life-threatening causes. These include acute coronary syndromes, aortic dissection, pulmonary embolism (PE), ruptured aortic aneurysm, and tension pneumothorax[2]. Thus, early diagnosis and intervention are important. In patients with non-life-threatening chest pain, it may be only after a complete workup, including a comprehensive history, physical examination, and some further investigations, that a diagnosis is reached.

In a large proportion of patients with transient acute chest discomfort, ACS or another acute cardiopulmonary cause is excluded but the cause is not determined. Therefore, the resources and time devoted to the evaluation of chest discomfort in the absence of a severe cause are substantial. Nevertheless, a disconcerting 2–6% of patients with chest discomfort of presumed non-ischemic etiology who are discharged from the ED, are later deemed to have had a missed myocardial infarction (MI) [1]. 25% percent of ECG normal cases were shown in one study to have myocardial infarction. So if the clinical picture suggests myocardial infarction better to do cardiac enzymes and further workup like echocardiography. And also patients with acute myocardial infarction who are mistakenly discharged from the emergency department have short term mortality rates of about 25 percent, at least twice what would be expected if they were admitted [13,14].

The diagnostic approach to chest pain, which is 'a "risk avoidance" and a "rule out coronary heart disease" strategy, might improve with better knowledge of the wide spectrum of etiology of non-cardiac chest pain. These conditions include musculoskeletal syndromes, pulmonary disease, psychological disorders (panic attacks, anxiety, or somatization) and disorders of abdominal viscera[3]. A confident diagnosis of musculoskeletal chest pain can be challenging because no clear reference standard exists.

When previous literatures of chest pain from various countries were reviewed, It was observed. In 2012–2013 there were 237,832 emergency admissions to hospitals in England with chest pain representing 4.5% of all emergency admissions[5, 9].A prospective observational study that was conducted in western, French-speaking Switzerland between March and June 2001, it showed that chest pain is a common symptom in primary care, as about 1.5% of the population visit a general practitioner (GP) for such reason over a one-year period. The causes of chest pain in 651 patients after 12 months: musculoskeletal

chest pain (49%), cardiovascular (16%), psychogenic (11%), respiratory (10%), digestive (8%) and miscellaneous (2%) [6].

In a retrospective study done in Pretoria South Africa by Mimi geyser et al in 2016 about chest pain prevalence causes and disposition in emergency department of Pretoria hospital found the prevalence of chest pain to be 1.66%, the most common cause was respiratory illness (36.19%) and pneumonia was the most common diagnosis (24.40%). Musculoskeletal problems (21.90%) and cardiovascular disease (21.43%) were next in line and in cardiovascular causes ischemic heart disease was the most common. Similar to the study done in the USA patients with cardiovascular disease tend to be older than the average age, with a mean age of 55.07 (SD 16.04) years. Patients with psychological disorders were younger than average, with a mean age of 29.86 (SD 6.79) years. The mean age for patients with respiratory disease was 43.21 (SD 16.58) years and for musculoskeletal problems 35.74 (SD 10.83) years[7].

In the sub Saharan African, according to a systematic review that included seven observation studies with 92,378 participants from 5 countries (South Africa, Sudan, Nigeria, Senegal, and Kenya) showed acute myocardial infarction prevalence rate to be in the range of 0.1–10.4%[15]

In our setting, there is no data regarding the prevalence of chest pain in the emergency department. But the incidence of myocardial infarction was found to be alarming in a study done in Halibet National Referral Hospital in Asmara between 1997 and 2001that showed that the incidence of acute Myocardial infarction was 4.35 per 1000 admissions.[10]. And a retrospective study conducted in Orotta National Referral Hospital Intensive Care Unit (ONRH-ICU) in Asmara for ten years (2005–2015) by Elias…et al showed majority of patients 79% presented with STEMI which is one of the top killers' worldwide[11].

Methods

Study design and setting

We conducted a retrospective descriptive study of patients who visited the emergency department of Orotta National Referral and Teaching hospital, Asmara, Eritrea from January 1st to December 31st of 2018 with chief complaint of chest pain.

Study population

The study population was made up of all patients 15 years and older who have done ECG. Those with inadequate history, recent history of chest trauma, foreigners and pregnant women were excluded.

Data collection

Records of all patients were assessed and a questionnaire that includes the patient demographics and history was used to collect data. The diagnoses were subdivided into the following groups: cardiovascular, respiratory, gastrointestinal, musculoskeletal, psychiatric/psychogenic, and other. Cardiovascular causes were subdivided into STEMI, NSTEMI, angina pectoris, arrhythmia, acute aortic syndromes, and pulmonary embolism.

Statistical analysis

The data was collected using Microsoft excel and cleaned followed by analysis using SPSS version 20, where the total frequency of each diagnosis along with percentage was calculated. The significance level was set to $\alpha = 0.05$

Results

Patient characteristics

According to the ED department of Orotta National Referral Hospital register 855 patients presented with primary symptom of chest pain over the study period. 441(51.6%) were due to respiratory causes the most common being pneumonia 415(94.1%) followed by cardiac cause at 234(27.4%). Table 1 provides frequency and percentage the system affiliated with diagnoses of the cause of the chest pain.

Table 1

	Frequency	Percentage
Cardiac	234	27.4%
Respiratory(pneumonia)	441(415)	51.6%(94.1%)
Gastrointestinal	24	2.8%
Musculoskeletal	46	5.4%
Others	44	5.1%
Not found	57	6.7%
Foreigners	7	0.8%
Exempted	3	0.3%
Total number of patients	855	100%

Out of the study population 253 study sample were taken with inclusion criteria of those who did an ECG. In those study sample the most common cause was cardiovascular (58.9%) out of which the most

common illness was ST elevation myocardial infarction (23.7%) as presented below in Table 2. electrocardiogram was found to have significant effect on final diagnosis mean − 1.178, 99% confidence interval (CI)(-1.519- -0.837);p < 0.01. and it also had significant effect on outcome mean 2.312, 99% confidence interval (CI) (2.013−2.611):p < 0.01.

Table 2

Diagnosis according to system	Frequency	Percent
Cardiovascular	149	58.9
Respiratory	18	7.1
Muscloskeletal	44	17.4
Gastrointestinal	21	8.3
Psychological	2	0.8
Others	19	7.5
Total	253	100

When comparing both males and females according to diagnosis of the system affected, in males 119(63%) were with diagnosis of cardiovascular system affected and 13(6.9%) were with diagnosis of respiratory system affected. In females 34(53.1%) were with diagnosis of cardiovascular system affected and 5(7.8%) were with diagnosis of respiratory system affected.

Table 2.1

What is the gender?	what is the system affected	Frequency	Percent
Male	Cardiovascular	119	63.0
	Respiratory	13	6.9
	Muscloskeletal	32	16.9
	gastrointestinal	15	7.9
	Others	10	5.3
	Total	189	100.0
Female	cardiovascular	34	53.1
	Respiratory	5	7.8
	muscloskeletal	12	18.8
	gastrointestinal	6	9.4
	psychological	2	3.1
	Others	5	7.8
	Total	64	100.0

Regarding the distribution of age group of those who came with the complaint of chest pain, the most common was between 52–68 years of age representing 36.4%(Table 3). There was significant association between age and final diagnosis mean – 1.925, 99% confidence interval (CI) [-2.495–-1.355]; $p < 0.01$), and also between age and outcome mean 1.565, 99% confidence interval (CI) [1.398–1.732]; $p < 0.01$). The odds ratio of age greater than or equal to 69 being deceased to age less than 69 was, (OR 6.367, 95% CI [2.606–15.557]; $p = 0.016$), with a probability of 86.4%.

Table 3

Age group	Frequency	Percent
15 to 34	41	16.2
35 to 51	68	26.9
52 to 68	92	36.4
69 to 85	43	17
86 to 92	7	2.8
93 to 109	2	0.8
Total	253	100

In analysis of the sample study, there were 186(74.7%) males and 67(25.3%) females. The most common character of chest pain in the study was constricting, precordial; dull aching, sudden, crushing, squeezing, pressure like, chest tightness and retrosternal type (73.5%) as per the patients description. The most common associated symptom was found to be shortness of breath with sweating or with dyspepsia or with vomiting or with palpitation or with generalized body weakness (29.6%). The character of chest pain has significant effect on final diagnosis mean − 2.834,99% confidence interval(CI)(-3.332- -2.336):p < 0.01. The associated symptoms had also significant effect on final diagnosis mean − 1.644,99% confidence interval (CI)(-2.171- -1.117) p < 0.01.

The most common co morbidity was hypertension (26.5%) and those without any co morbidity were 40.3%. But in spite of that the co-morbidity diabetes had significant effect on final diagnosis mean − 2.818,99% confidence interval(CI) (-3.306-2.331):p < 0.01). Smoking as a risky life style had significant effect on outcome mean 0.798, 99% confidence interval (CI)(0.724−0.873):p < 0.01. For smokers the odds ratio of being deceased to discharged was, (OR 0.3, 95% CI [0.107−0.839]; p = 0.016), with a probability of 23%.

The management type in our study was supportive for myocardial infarction, pulmonary embolism, aortic thrombosis and definitive for angina pectoris (stable and unstable), arrhythmia, respiratory, musculoskeletal, gastrointestinal disease and others. The diagnostic modality chest x-ray has significant effect on final diagnosis mean − 2.787,99%confidence interval(CI)(-3.297- -2.276);p < 0.01

The outcome was 230(90.9%) were discharged and 23 (9.1%) died. The most common cause of death was pulmonary embolism 2 (66.7%), followed by ST elevation myocardial infarction 13(21.7%). The most common cause of death according to the system affected was cardiovascular (13.7%).The age group 93 to 109 had 2(100%) death occurrence followed by the age group 69 to 85 10(23.3%). final diagnosis has significant effect on outcome mean 3.490, 99% confidence interval (CI)(2.984−3.996):p < 0.01.

Discussion

It is crucial to notice which chest pain is dangerous and which is nonlife threatening in the emergency department. So far the literature focuses on evaluation of patients with chest pain but not the range of conditions that present with chest pain. In this study we planned to elucidate the common causes of chest pain in Orotta National Referral hospital, Asmara, Eritrea and what demographic characteristics are associated with those conditions in patients presenting with chest pain to the emergency department of Orotta National Hospital. Thus it can aid health personnel for appropriate diagnosis and intervention in life threatening causes and also use this research as a basis algorithm for fast action to be taken.

The most common diagnosis seen in the population and the sample study differed, because the ones who did electrocardiogram were the ones who were highly symptomatic for cardiac disease, and this led to the most common disease being cardiovascular in origin in the sample study. Similar to the results of

the population of our study, in a study done in south Africa by Mimi Geyser et al respiratory causes were found to be the common cause of chest pain[7].

Males were dominantly presenting with chest pain in our study sample since in males there is higher association with risky life styles like smoking and the absence of protective effect of estrogen in males unlike females. The age group which has highest percentage of life threatening chest pain was found to be above 52 years of age with 107(74%) in number, similar to the median age group for menopause (51.4), so the loss of protective hormone estrogen has significant effect on the deadliness of the chest pain. When comparing the prevalence of diagnosis of cardiovascular system and diagnosis of respiratory system males had higher prevalence in both diagnoses.

A retrospective study which included all Emergency department visits to nonfederal, general, acute care hospitals in the United States from January 1, 2005, to December 31, 2011,done by Jeffrey A. Tabas, MD et al showed The most common diagnosis was nonspecific chest pain (5624 [51.7%]; 95%

CI, 50.1%-53.4%).[4] while in this study the most common diagnosis was respiratory diseases 441(51.6%) out of which the most common diagnosis was pneumonia 415(94.1%) in the population study and cardiac disease in the sample study 149(58.9%) out of which the most common diagnosis was STEMI 60(23.7%) .

There was highest death rate in patients with pulmonary embolism. The death rate of pulmonary embolism in our study was 66.7% which was higher compared to the one done by Carlson JL et al ,goldhaber SZ et al which showed death rate of 3%-11%[21-30]. Similar to it the mortality rate of STEMI in our study was 21.7% which was higher than the study done by Roe MT et al, rosamond WD et al, Jernberg T et al, Tobbia P et al, Mcmanus DD et al which showed mortality rate 2-10%[16-20].

There was rise in mortality as the age increased from middle age and was highest when the age group reached above 86years old. The character of chest pain and the associated symptoms were essential in reaching the final diagnosis in our study. In addition to that diagnostic modalities ECG and CXR had a significant role in reaching the diagnosis according to our study. But out of all the co morbidities and risky life styles diabetes was the only one found to affect the diagnosis. While smoking was found to have an effect in the outcome of the patient treated.

Conclusion

In the study it was observed that character of chest pain and associated symptoms can aid in reaching the diagnosis. Diagnostic modalities like ECG and CXR are important in ascertaining a diagnosis. Diabetes as a co-morbidity was seen to cause cardiovascular complications. Being a smoker or an elderly was associated with high mortality. The diagnosis reached and the ECG results were seen to have an effect in mortality. There was high mortality in STEMI and Pulmonary embolism in our study which could be the effect of no definitive treatment with supportive management in these two diseases in our setting.

Abbreviations

ECG: Electrocardiogram

ED: Emergency Department

CXR: Chest X-ray

SPSS: Statistical Package of Social Sciences

STEMI: ST segment Elevation Myocardial Infarction

NSTEMI: Non ST segment Elevation Myocardial Infarction

PE: Pulmonary Embolism

GP: General Practioner

CI: Confidence Interval

OR: Odds Ratio

Declarations

Ethics approval and consent to participate

The study was approved by Ministry of Health ethical and research committee, Clinical Service Division and from Orotta National Referral Hospital. Consent to participate is not applicable as retrospective hospital record was used.

Consent for publication

Not applicable

Availability of data and materials

The data used during the current study can be made available from the corresponding author on request.

Competing interests

The authors declare that they have no competing interests.

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