# Characterization of chest pain in patients attending the emergency department of a high-complexity-level health-care institution, during 2014-2015, in Medellín, Colombia

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## ABSTRACT

*Introduction:* Acute chest pain is a distressing sensation between the diaphragm and the base of the neck and it represents a diagnostic challenge for any physician in the emergency department.

*Objective:* To establish the main clinical and epidemiological characteristics of patients who present with chest pain to the emergency department in a private clinic from the city of Medellin.

*Methods:* Cross-sectional retrospective observational study, were patients who consulted for chest pain in the emergency department who met the eligibility criteria during 2014-2015. The information was analyzed in SPSS program vr.21; qualitative variables were described through relative frequencies, and the quantitative through mean and standard deviation or medians according to their distribution in the study population.

*Results:* A total of 231 patients were evaluated, the mean age was 49.5 ± 19.9 years, 56.7 % were females. The most frequent pathological antecedents were hypertension 35.5 %, diabetes 10,8 %, dyslipidemia 10.4 % and coronary disease 5.2 %. Regarding pain features, in 40.3 % of the patients the pain began abruptly, in 38.2 % it had a precordial location, for 20 % of the cases physical activity acted as a trigger, and 60.6 % was oppressive. Costochondritis was the most common cause of chest pain among patients with an established etiologic diagnosis, representing the 18.2 %.

*Conclusions:* Although the clinical features of pain reported coincide with the clinical presentation of an acute coronary syndrome, the most common cause of chest pain in study population was costochondritis instead, indicating that it is a differential diagnostic in the approach of patients with pain acute chest.

**Key words:** Chest pain, osteochondritis, acute coronary syndrome.

## RESUMEN

*Introducción:* El dolor torácico agudo es una sensación dolorosa que se manifiesta entre el diafragma y la base del cuello, e implica un reto diagnóstico para cualquier médico en el servicio de urgencias.

*Objetivo:* Determinar las principales características clínicas y epidemiológicas de los pacientes que consultan por dolor torácico en una clínica privada de la ciudad de Medellín.

*Metodología:* Estudio observacional retrospectivo transversal, realizado con la información consignada en las historias clínicas de los adultos que consultaron por dolor torácico en el servicio de urgencias, en el periodo 2014-2015, y que cumplieron con los criterios de elegibilidad. La información se analizó en el programa SPSS 21, a las variables cualitativas se les calcularon frecuencias absolutas y relativas y a las cuantitativas se utilizaron promedios con desviación estándar o medianas.

*Resultados:* Se evaluaron un total de 231 historias clínicas de pacientes que consultaron por dolor torácico. La edad promedio fue 49,5 ± 19,9 años, sexo femenino 56,7 %. Los antecedentes personales más frecuentes fueron hipertensión arterial 35,5 %, diabetes 10,8 %, dislipidemia 10,4 % y enfermedad

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coronaria 5,2 %. Respecto a las características del dolor, el 40,3 % fue de inicio súbito, de localización precordial el 38,2 %, para el 20 % el desencadenante fue la actividad física y el 60,6 % era de carácter opresivo. De los pacientes con diagnóstico etiológico, el más frecuente fue costocondritis con 18,2 %.

*Conclusiones:* A pesar de que las características clínicas del dolor reportadas coinciden con la presentación clínica de un síndrome coronario agudo, la etiología más frecuente no fue esta, sino que fue la costocondritis, indicando que es un diagnóstico diferencial en el enfoque de un paciente con dolor torácico agudo.

**Palabras clave:** Dolor en el pecho, osteocondritis, síndrome coronario agudo.

## INTRODUCTION

Pain is defined by the International Association for the Study of Pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage". It is important to know the location and diagnosis of acute pain so as to minimize or prevent tissue damage, complications and adverse effects (1).

Chest pain (CP) is defined as the painful feeling that appears between the diaphragm and the base of the neck, and it involves a diagnostic challenge for any doctor in an Emergency Department, with the goal of differentiating patients that require urgent inpatient treatment from those who can be managed as outpatients (2). The etiologies to be discarded include a large number of pathologies that affect organs and structures located in the thorax and abdomen, so a wrong diagnosis may have serious consequences, even resulting in death; for this reason, it is essential to identify the clinical signs indicating illnesses that require urgent management (3). The three main entities that should be discarded owing to their seriousness are, in order of frequency: ACS, PD and AAS; however, in most cases, chest pain is caused by other conditions of a benign nature, with less than 5% of cases for ACS with ST elevation (STEMI) (4,5).

Chest pain represents between 5% and 20% of admissions to emergency services in the United States, and is the second most-frequent reason for consultation. Among these, approximately 50% requires inpatient management with an annual cost of 10 to 12 trillion dollars (6,7). Additionally, 13% of patients with CP and a normal electrocardiogram (ECG) correspond to acute myocardial infarction (AMI), 35% to non-specific or parietal CP, 27% to gastroesophageal reflux or peptic ulcer and 25% to CP of psychiatric origin (3).

This study's objective was to determine the main clinical and epidemiological characteristics of patients who were attended for chest pain at a private clinic of the city of Medellin, in the period 2014-2015.

## MATERIALS AND METHODS

A descriptive, transversal, retrospective, observational study was carried out, including the clinical records of patients aged above 18 years old who were attended for chest pain in the Emergency Department of a high-complexity-level health-care institution in Medellín, Colombia, during the period 2014-2015. The investigators collected data by using a form that included the study variables (socio-demographic characteristics, personal and family background, diagnosis, pain characteristics, results of paraclinical examinations, and habits and lifestyles). A database was created in the program SPSS version 19 to record and analyze information. For qualitative variables, absolute and relative frequencies were calculated and, for quantitative variables, mean value and standard deviation were considered. The investigation was classified as non-risk according to resolution 008430 of 1993 of the Colombian Health Ministry, and it had an ethical guarantee from the institution where it was carried out.

## RESULTS

This study included 231 clinical records of patients with chest pain. Mean age was 49.5 ± 19.9 years old. 56,7% of the patients were female, 96.1% belonged to the contributory regime, one of every two had secondary school education or higher, and were occupied as employees (26%) or housewives (23.4%) (Table I).

Table II shows that the most frequent personal antecedents were high blood pressure, with 35.5%, diabetes, with 10.8%, dyslipidemia, with 10.4% and heart disease, with 5.2%.

Duration of the pain was registered in 190 clinical records, ranging from 7 to 12 hours in 98.9%, and from 1 to 6 hours in the remaining 1.2% of patients. As regards other chest pain characteristics, Table III shows that predominant aspects were: sudden onset (40.3%), oppressive (60.6%), precordial location (38.2%), non-irradiated (43.1%). The main triggers were physical activity and stress (20% each), improved by taking anti-inflammatory medication (29.2%) and worsened by breathing (38.3%). The symptoms most frequently associated with chest pain were dyspnea (39.7%) and nauseas (14%).

Only 190 of the 231 clinical records included electrocardiogram results. The most frequent characteristics of this diagnostic test were sinus rhythm (95.8%) and normal ST segment; the rest of findings can be seen in Table IV.

Table V includes information on the lifestyles of 124 patients with chest pain. Smoking and alcohol consumption were the most frequent habits (25 and 13.7%, respectively).

The 231 patients registered a discharge diagnosis; however, only in 83 (35.9%) was an etiological diagnosis esta-

**TABLE I**
**SOCIO-DEMOGRAPHIC CHARACTERISTICS OF 231 PATIENTS WITH CHEST PAIN**

| Variable | n (%) |
|---|---|
| *Gender* | |
| Female | 131 (56.7) |
| Male | 100 (43.3) |
| *Regime* | |
| Contributory | 222 (96.1) |
| Subsidized | 2 (0.9) |
| No data | 7 (3.0) |
| *Education* | |
| None | 2 (0.9) |
| Primary | 52 (22.5) |
| Secondary | 85 (36.8) |
| Undergraduate | 26 (11.3) |
| Postgraduate | 1 (0.4) |
| No data | 65 (28.2) |
| *Occupation* | |
| Employee | 60 (26.0) |
| Housewife | 54 (23.4) |
| Unemployed | 12 (5.2) |
| Student | 12 (5.2) |
| Retired | 10 (4.3) |
| Independent | 9 (3.9) |
| Other | 20 (8.7) |
| No data | 54 (23.4) |

**TABLE II**
**PERSONAL ANTECEDENTS OF 231 PATIENTS WITH CHEST PAIN**

| Antecedent* | n (%) |
|---|---|
| Arterial hypertension | 82 (35.5) |
| Diabetes | 25 (10.8) |
| Dyslipidemia | 24 (10.4) |
| Heart disease | 12 (5.2) |
| Gastrointestinal diseases | 11 (4.8) |
| Obesity | 6 (2.6) |
| Acute myocardial infarction | 5 (2.2) |
| Deep vein thrombosis | 4 (1.7) |
| Psychiatric diseases | 3 (1.3) |
| Cerebrovascular disease | 2 (0.9) |
| Pulmonary thromboembolism | 1 (0.4) |
| Others | 93 (40.3) |

*Each patient may have more than one personal antecedent.

**TABLE III**
**CHARACTERISTICS OF PAIN IN PATIENTS WITH CHEST PAIN**

| Characteristics | n (%) |
|---|---|
| *Onset (n = 115)* | |
| Sudden | 93 (40.3) |
| Progressive | 22 (9.5) |
| *Location of the pain (n = 186)* | |
| Precordial | 71 (38.2) |
| Retroesternal | 30 (16.1) |
| Diffuse | 24 (12.9) |
| Intercostal | 9 (4.8) |
| Others | 52 (28.0) |
| *Trigger (n = 45)* | |
| Physical activity | 9 (20.0) |
| Stress | 9 (20.0) |
| Alcohol consumption | 6 (13.3) |
| Swallowing | 5 (11.1) |
| Respiratory movements | 4 (8.9) |
| Muscular movements | 3 (6.7) |
| Trauma | 2 (4.4) |
| Others | 7 (15.5) |
| *Character (n = 137)* | |
| Oppressive | 83 (60.6) |
| Sharp | 32 (23.4) |
| Burning | 8 (5.8) |
| Piercing | 1 (0.7) |
| Other | 13 (9.5) |
| *Irradiation (n = 153)* | |
| Non-irradiated | 66 (43.1) |
| Upper left limb | 41 (26.8) |
| Neck | 13 (8.5) |
| Upper right limb | 11 (7.2) |
| Back | 11 (7.2) |
| Jaw | 3 (2.0) |
| Epigastrium | 3 (2.0) |
| Migratory pain | 2 (1.3) |
| Other different regions | 3 (2.0) |
| *Situations in which it improves (n = 24)* | |
| Consumption of anti-inflammatories | 7 (29.2) |
| Rest | 5 (20.8) |
| Spontaneous improvement | 3 (12.5) |
| Consumption of nitrates | 2 (8.3) |
| Consumption of antiacids | 1 (4.2) |
| Others* | 6 (25.0) |

CHARACTERIZATION OF CHEST PAIN IN PATIENTS ATTENDING THE EMERGENCY DEPARTMENT OF
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| Situations in which it worsens (n = 86) | |
|---|---|
| Breathing | 33 (38.3) |
| Movements | 26 (30.2) |
| Palpation | 10 (11.6) |
| Physical activity | 7 (8.1) |
| Decubitus | 4 (4.6) |
| Coughing | 4 (4.6) |
| Consumption of food | 1 (1.1) |
| Leaning forward | 1 (1.1) |
| Associated signs and symptoms (n = 171) | |
| Dyspnea | 68 (39.7) |
| Nauseas | 24 (14.0) |
| Vomiting | 19 (11.1) |
| Coughing | 16 (9.3) |
| Flu-like symptoms | 10 (5.8) |
| Fever | 9 (5.2) |
| Tachycardia | 7 (4.1) |
| Paresthesias | 6 (3.5) |
| Syncope | 5 (2.9) |
| Bradycardia | 4 (2.3) |
| Alteration ithe state of consciousness | 2 (1.2) |
| Hemoptysis | 1 (0.6) |

*Others: vomiting, consumption of valerian, aluminium hydroxide, paracetamol, ranitidine, salbutamol (each with one case).

**TABLE IV**
ELECTROCARDIOGRAM CHARACTERISTICS OF 190 PATIENTS WITH CHEST PAIN

| Characteristics* | n (%) |
|---|---|
| Sinus rhythm | 182 (95.8) |
| Normal ST segment | 180 (94.7) |
| Inverted T wave | 7 (3.6) |
| ST segment elevation | 5 (2.6) |
| ST segment depression | 4 (2.1) |
| Spiked T wave | 2 (1.05) |
| Tachyarrithmias | 2 (1.1) |
| Blockage | 2 (1.1) |
| Escape rhythms | 1 (0.5) |
| Bradyarrithmias | 1 (0.5) |

* Each patient may have more than one characteristic positive.

**TABLE V**
LIFESTYLES OF 124 PATIENTS WITH CHEST PAIN

| Lifestyle | n (%) |
|---|---|
| Smoking | 31 (25.0) |
| Consumption of alcohol | 17 (13.7) |
| Consumption of psychoactive drugs | 4 (3.2) |
| Ex-smoker | 3 (2.4) |
| Cooking with firewood | 1 (0.8) |
| Inactivity | 1 (0.8) |

*Each patient may have more than one lifestyle positive.

blished, the most frequent in this group being costochondritis, with 42 cases (18.2%). Additionally, acute myocardial infarction (AMI) was only diagnosed in 2.6% of patients. 6.1% of patients showed positive troponin I values (> 0.05 ng/ml), this parameter being included in only 37.2% of clinical records, which suggests the need to improve the registration of information.

## DISCUSSION

The study carried out in Colombia by Mora et al. (8), involving 466 patients under conditions similar to ours, reported an average age of 62.3 years old, while in this investigation it was 49.5 years old, more in line with the one reported by Undheim et al. (9) in 108 Norwegians with 51.2 years old, and Muñoz et al. (10) of 957 Chileans with 50.16 years old.

The female sex made up the largest number of cases (56.7%), the same as in the studies by Martínez-Sellés et al. (11) in Spain, by Undheim et al. (9) and Muñoz et al., with 54.6%, 56.4% and 51.3%, respectively, unlike the data from Mora et al. (8) where women contributed 45.4% of the total.

As regards personal antecedents, the studies carried out by Leite et al. (6), Sprockel et al. (5) and Soeiro et al. (12) found that arterial hypertension was the most frequent antecedent, affecting 53.6%, 57.% and 68% of patients, respectively, the same as in this study, despite representing a smaller proportion at 35.5%. With respect to heart disease, Sprockel et al. (5) reported 38.1% of patients with this condition, a figure higher than the 5.2% found in this study.

In relation to the characteristics of chest pain, the most frequent in our patients were the same, and with almost the same frequency, as those found by Mora et al. (8) as regards oppression, radiation to upper left limb and physical activity as the main triggers. Nevertheless, precordial location was less in our study than as reported by the same authors, with 38.2% versus 47.7%.

The factor associated with pain improvement found most frequently was rest, with 28.6% in the study carried out by Mora et al. (8), while in this study it was consumption of anti-inflammatory drugs, with 29.2%. This may be explained by the fact that in this investigation the predominant diagnosis in the population studied was costochondritis; this ailment, also known as Tietze syndrome, causes pain due to inflammation of the costochondral junction, therefore anti-inflammatories solves this clinical presentation (13).

Breathing, movement and palpation were the three main factors to cause an increase in pain, as mentioned in the paragraph above. Inflammation, present in costochondritis, produces pain in the patient that worsens with the different movements that involve the thoracic cavity in the adversely affected joints or with palpation of the costochondral junction (13).

As regards associated signs and symptoms, Soeiro et al. (12) found that dyspnea was the most frequent, presented in 89% of cases versus 39% in our study, as the pathologies that most frequently produce chest pain are accompanied by dyspnea.

In relation to the characteristics of the electrocardiogram, Martínez-Sellés et al. (11) identified that 92.7% of patients presented with sinus rhythm, and only 5.2% showed ST segment elevation, similar results to the ones found in this study, where 95.8% had sinus rhythm and 2.6% had ST segment elevation. This last percentage coincides with the patients diagnosed with AMI in this study, as the large majority of diagnoses did not correspond to myocardial ischemia; the predominant pattern in the ECG test was sinus rhythm.

6.1% of patients with chest pain were troponin I-positive (> 0.05 ng/ml); this is associated with a high probability that the etiology of this ailment is ischemic cardiopathology. Although only a small percentage of patients presented with ischemia, the approach should be closely focused on discarding this pathology, as it seriously compromises the patient's life.

This study found that smoking and alcohol consumption were the most frequent habits (25% and 13.7%, respectively), lower figures than those reported by Muñoz et al. (10), with 28.4% and 33.9%, respectively.

Martínez-Sellés et al. (11) reported costochondritis as the main discharge diagnosis in 59% of patients; this study found a similar result, but in a much smaller proportion (35.9%).

This study's greatest limitation was the lack of information on some variables, which meant that their frequencies were calculated regarding the number of records with the data.

## CONCLUSION

This study was able to identify that, although the clinical characteristics of the pain reported coincide with the clinical presentation of an acute coronary syndrome, this was not the most frequent etiology, but was instead costochondritis or Tietze syndrome, which is an inflammatory pathology that may often simulate the clinical picture of myocardial ischemia and, therefore, should be a differential diagnosis when approaching a patient in consultation for chest pain.

An major recommendation is that chest pain is a non-specific symptom that may have different etiologies, some of which, such as myocardial ischemia, require early detection and appropriate treatment. For this reason, it is important for the doctor to manage the patient correctly, with a complete diagnostic approach that allows him to initially discard pathologies that compromise the patient's life.

Owing to the fact that the greatest limitation was incomplete information on some variables of interest, it is important to remember that the clinical record is an useful tool for doctor and patient and, therefore, it is necessary to carefully and completely register and information, as this ensures the availability of all the data regarding the patient's different episodes, allowing an attending physician, in the future, to know the antecedents and procedures that the patient has already received, as well as providing evidence of how the patient was approached.

## CONFLICT OF INTEREST

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