



# Epidemiological characteristics of patients who required primary angioplasty. A single-center observational study.

Eliezer Arellano Rojas <sup>1</sup> \*, Eduardo Barrio Nuñez <sup>2</sup> , Juan Pablo Masías Toapanta <sup>1</sup>

1. Cardiology Service, Hospital Alcívar, Guayaquil, Ecuador.
2. Hemodynamics Service, Alcívar Hospital, Guayaquil, Ecuador.

## Abstract

**Introduction:** Acute coronary syndrome (ACS) comprises a broad spectrum of characteristic clinical symptoms associated with myocardial ischemia. The treatment of choice is percutaneous coronary intervention (PCI). This study aimed to describe the epidemiological characteristics of a group of patients with ACS who required IPC at a local referral center for cardiac catheterization.

**Methods:** This cross-sectional study was conducted at the Alcívar Hospital in Guayaquil, Ecuador, from January to December 2020. Adult patients diagnosed with ACS who required IPC were included. The variables were sex, age, cardiovascular risk factors, anatomy of coronary artery lesions, and number of stents that required PCI. The sample was nonprobabilistic. Descriptive statistics were used.

**Results:** A total of 87 patients were analyzed, 69 (79.3%) of whom were men. The most prevalent age was 61-80 years, with 62% (n=54). The most pervasive associated risk factor was a sedentary lifestyle (40.65%, n = 87), followed by hypertension (30.84%, n: 66). Seventy-one percent had a single-vessel lesion, with the left coronary artery being the most affected in 70.48%.

**Conclusions:** The results are comparable with international statistics.

## Keywords:

**MeSH:** Angioplasty, Risk factors, Acute coronary syndrome

---

## Abbreviations

IPC: percutaneous coronary intervention.  
ACS: acute coronary syndrome.  
RC: Right coronary.  
ADA: anterior descending.  
CX: circumflex.

## Supplementary information

No supplementary materials are declared.

## Acknowledgments

Not declared.

## Author contributions

Eliezer Arellano Rojas: Conceptualization, data curation, formal analysis, fundraising, research, writing - original draft.  
Eduardo Barrio Nuñez: Conceptualization, Data curation, Formal analysis, Juan Pablo Masías Toapanta: Acquisition of funds, Research, Methodology, Resources, Supervision, Validation, Visualization, Writing - original draft, Writing - review and editing.  
All authors read and approved the final version of the manuscript.

## Financing

The authors of this article financed the expenses of this research.

## Availability of data and materials

Not declared.

## Introduction

Acute coronary syndrome (ACS) is a group of conditions caused by stenosis or complete obstruction of the coronary arteries, which can lead to myocardial infarction or sudden cardiac death. ACS symptoms can vary but may include typical chest pain, shortness of breath, recurrent nausea or vomiting, diaphoresis, extreme fatigue, vertigo, or dyspnea [1].

ACS is caused by several factors, including heart disease, smoking, high blood pressure, hypercholesterolemia, diabetes, obesity, physical inactivity, and advanced age [2]. ACS is the leading cause of death in men and the second leading cause of death in women. In the United States, it is estimated that more than 879,000 heart attacks and more than 525,000 deaths from coronary heart disease occur each year [3]. Among cardiovascular diseases, ACS is the most prevalent and has gained great significance in recent decades in Ecuador [4]. However, there has not been an established statistical analysis of coronary lesions that required coronary angioplasty or risk factors associated with said alteration.

The term “acute coronary syndrome” is a useful tool to describe any symptom consistent with myocardial ischemia and is classified into ST-elevation and non-ST-segment elevation myocardial infarction, unstable angina, and sudden cardiac death [5].

ACS is a medical emergency, and early treatment can save lives. Until a few years ago, the treatment of coronary disease was confined to administering antianginal drugs and aorto-coronary bypass surgery. On September 16, 1977, Andreas Gruentzig introduced coronary angioplasty, a nonsurgical method of myocardial revascularization that acts directly on the atheromatous plaque [6].

Percutaneous coronary intervention (PCI) is the treatment of choice for discrete one- and two-vessel lesions in patients with good left ventricular function. It plays a vital role in complex revascularizations in patients with multivessel coronary disease and depressed left ventricular function [7]. Today, there are many techniques to open stenosed arteries, not only coronary arteries but also peripheral arteries and large vessels of the body. Various methods, including balloons, stents, lasers, filters, suction cups, and other tools, are collectively called IPC [8].

This study aimed to describe the epidemiological characteristics of a group of patients with ACS who required primary angioplasty at a local referral center for cardiac catheterization.

## Materials and methods

### Study design

The present study is cross-sectional. The source is retrospective.

### Scenery

The study was conducted in the hemodynamic service of the Alcívar Hospital in Guayaquil, Ecuador. The study period was from January 1, 2020, to December 31, 2020.

### Participants

Patients of legal age diagnosed with ACS who required IPC were included. Cases with incomplete data were removed for analysis.

### Variables

The variables were sex, age, associated cardiovascular risk factors, type of intervention, anatomy of coronary artery lesions, and number of stents that required PCI.

### Data sources/measurements

The source was indirect. An electronic form was completed from the data of the institutional clinical history of the patients who entered the hospitalization period. A review of the hemodynamic and emergency unit registry was carried out to compare the cases. The information was treated confidentially; personal data that would allow the identification of the study subjects were not included.

### Biases

To avoid possible interviewer, information, and memory biases, the principal investigator always kept the data with a guide and records approved in the research protocol. Observation and selection bias was avoided by applying the participant selection criteria. Two researchers independently analyzed each record in duplicate, and the variables were recorded in the database once their concordance was verified.

### Study size

The sample was nonprobabilistic, of the census type, where all possible cases of the study period were included.

### Quantitative variables

Descriptive statistics were used. The results were expressed on a scale of means and standard deviation. Categorical data are presented in proportions.

### Statistical analysis

Noninferential statistics are used. For the descriptive analysis, measures of central tendency and dispersion were calculated according to the measurement scale of each variable. Qualitative variables are represented as absolute numbers

and percentages; quantitative variables are represented as the mean and standard deviations.

## Results

### Participants

The study included 87 patients.

### Group characteristics

Angioplasty and stent placement were performed in all 87 cases. They were 69 (79.3%) men (Figure 1). The most prevalent age was 61-80, with 62% (n=54) (Figure 2). The most pervasive associated risk factor was a sedentary lifestyle (40.65%, n = 87), followed by AHT (30.84%, n: 66), obesity (10.28%, n: 22), and diabetes mellitus type II (9.81%, N: 21) (Table 1 and Figure 3).

### Coronary lesions

Single lesions of the coronary arteries were the most prevalent: 71% had a single vessel lesion and 29% a multivessel lesion (Figures 5 and 6), with the left coronary artery being the most affected, 70.48% (Figure 6).

## Discussion

Acute coronary syndrome is undoubtedly the most important differential diagnosis in patients evaluated for chest pain; it constitutes 15% to 25% of all consultations, and it is estimated that up to 2% of patients with ACS are discharged unexpectedly unnoticed after evaluation [9].

This study shows an interest in finding local epidemiological data that help us better understand the anatomical situation in ACS patients and allow us to act and intervene with greater confidence and speed in this type of pathology where time is short and primordial and where the demand for angioplasty treatments has been increasing over time. At Hospital Alcivar, an average of 120 angioplasties have been performed yearly; however, in 2020, a global pandemic began, and despite this, average production was maintained.

In this study, 79.31% of the patients who underwent angioplasty were male, while in a study in 2000 in Honduras, 54% were male subjects, and in a study conducted in Rosario Argentina in 2004, with a total of 1268 patients who underwent angioplasty, 72.5% were male. Another study indicates a prevalence of 62.9% in Latin America and one of 65.7% in the United States of men who present ACS [10].

In the CASS study [11], it was observed that 90.3% were male and that the remaining 9.7% were female. Therefore, this study indicates that there is a difference in the prevalence

of male patients of at least 10% compared to the rest of the investigations, less with the CASS study, but at an international level and averaged together with the rest of America. Latina, the male sex predominates in this type of intervention.

The prevalence in higher males is associated with risk factors such as smoking and obesity, compared to women who more frequently present diabetes - peripheral vascular disease.

At the Latin American level, the average age of patients with ACS is 60 years, while in the United States, the average is 63 years; in the Honduran study the age ranged from 23-93 years with a mean of 66 years, and in the Rosario study an average of 62.3 years was observed, in the CASS study an average of 51.2 years was obtained, while in this study an average of 63.4 was obtained. The age of presentation of ACS is similar in Guayaquil to that worldwide [11].

At the level of the vessels, it was found that in an Argentine study, the main vessel treated was the ICA, where the prevalence of ADA was 47.52%, followed by the RCA at 27.06%, and finally, the Circumflex Artery at 21.56%. A total of 1268 patients were included.

**Table 1.** Descriptive variables of the study.

Variable	No.=87	%
<b>Sex</b>		
Women	18	20.69
Man	69	79.31
<b>Age</b>		
41- 50 Years	6	6.90
51-60 Years	21	24.14
61-70 Years	31	35.63
71-80 Years	23	26.44
81-90 Years	6	6.90
<b>Risk factor's</b>		
Sedentary life-style	87	40.65
AHT	66	30.84
Obesity	22	10.28
T2DM	21	9.81
Smoking	11	5.14
Dyslipidemia	4	1.87
CKD	3	1.40

AHT: arterial hypertension. T2DM: Type 2 diabetes mellitus. CKD: Chronic kidney disease.

Figure 1. Study group gender

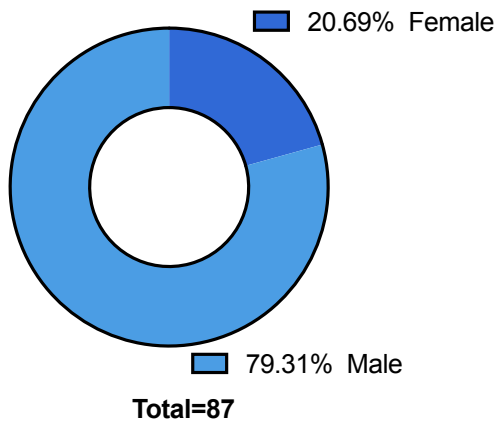


Figure 2. Study group age

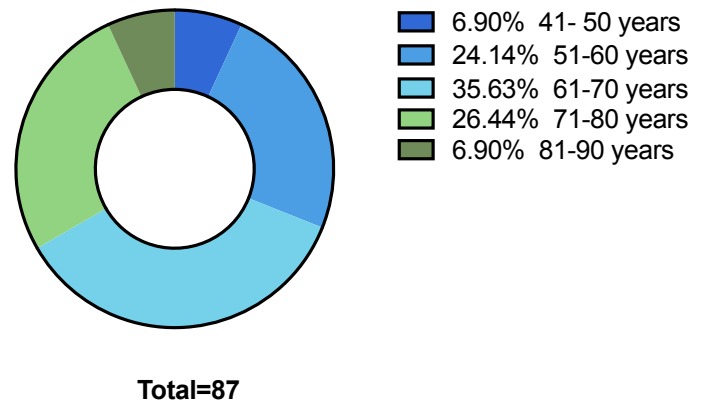


Figure 3. Risk factor's

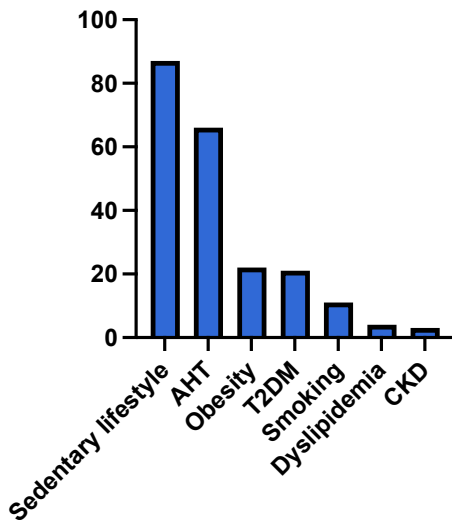


Figure 4. Coronary lesions by vessel number

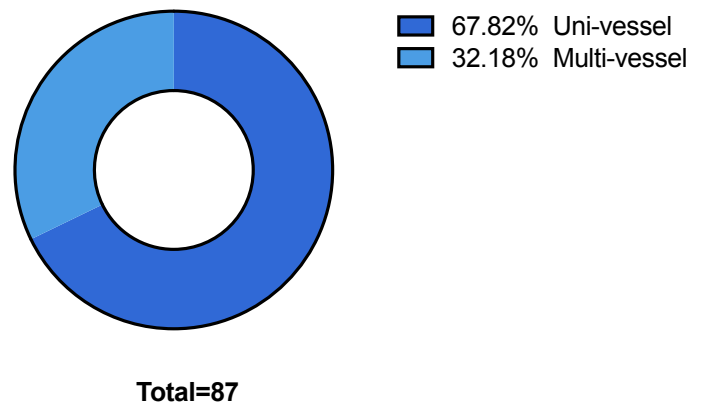


Figure 5. Affected vessels

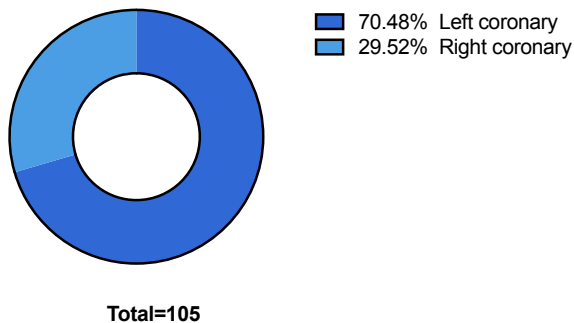
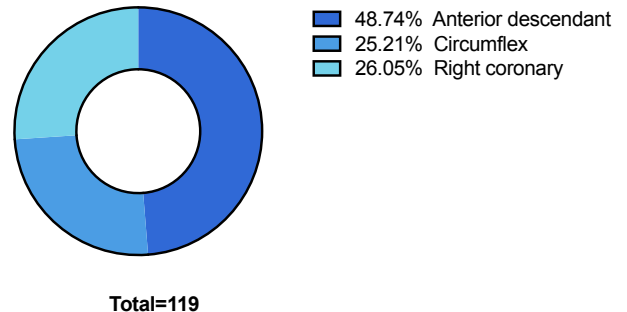


Figure 6. Affected vessels



These results are similar to the prevalence of the location of coronary lesions in this study, where the main vessel treated was the ICA, where the majority of the ADA was 48.74%, followed by the ACD with 26.05% and finally the Circumflex Artery with 25.21% of a total of 87 patients [12]. As there is no study similar to this one, where the characteristics of age, sex, level of coronary lesion, and number of stents are epidemiologically described, this study is beneficial. It serves as a guideline or initiative that this type of stent is being carried out in the country. of interventions, which in addition to being state-of-the-art and with specialized people trained in the subject, are first-choice procedures in heart diseases that are increasing in our population. New prospective studies with long-term mortality registration should be carried out.

## Conclusions

At a general level, the epidemiological values obtained in this study with the variables of age and sex agree with the data at the international level, where an average age of 60 years is handled in male patients, which are also closely similar to those of the countries of Latin America, as well as the epidemiological values of the coronary anatomy where the dominance is given by the RC artery and the prevalence of the location of the lesions at the coronary level at the level of the segments of the ADA artery followed by the circumflex artery.

## References

1. Atwood J. Management of Acute Coronary Syndrome. *Emerg Med Clin North Am.* 2022 Nov;40(4):693-706. doi: [10.1016/j.emc.2022.06.008](https://doi.org/10.1016/j.emc.2022.06.008). PMID: 36396216.
2. Smith JN, Negrelli JM, Manek MB, Hawes EM, Viera AJ. Diagnosis and management of acute coronary syndrome: an evidence-based update. *J Am Board Fam Med.* 2015 Mar-Apr;28(2):283-93. doi: [10.3122/jabfm.2015.02.140189](https://doi.org/10.3122/jabfm.2015.02.140189). PMID: 25748771.
3. Turpie AG. Burden of disease: medical and economic impact of acute coronary syndromes. *Am J Manag Care.* 2006 Dec;12(16 Suppl):S 430-4. PMID: [17203987](https://pubmed.ncbi.nlm.nih.gov/17203987/).
4. Miranda Solis EM. Clinical and epidemiological approach to acute coronary syndrome in a hospital in central Ecuador. *UTA Medicines.* 2023;5(1):53-62. Available at: [rev.uta/1101](https://rev.uta/1101)
5. Birnbaum Y, Wilson JM, Fiol M, de Luna AB, Eskola M, Nikus K. ECG diagnosis and classification of acute coronary syndromes. *Ann Noninvasive Electrocardiol.* 2014 Jan;19(1):4-14. doi: [10.1111/anec.12130](https://doi.org/10.1111/anec.12130). Epub 2013 Dec 30. PMID: 24382164; PMCID: PMC6931956.
6. Malik TF, Tivakaran VS. Percutaneous Transluminal Coronary Angioplasty. 2023 Feb 12. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. PMID: [30571038](https://pubmed.ncbi.nlm.nih.gov/30571038/).
7. Lawton JS, Tamis-Holland JE, Bangalore S, Bates ER, Beckie TM, Bischoff JM, Et al. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation.* 2022 Jan 18;145(3):e4-e17. doi: [10.1161/CIR.0000000000001039](https://doi.org/10.1161/CIR.0000000000001039). Epub 2021 Dec 9. Erratum in: *Circulation.* 2022 Mar 15;145(11):e771. PMID: 34882436.
8. Jia S, Liu Y, Yuan J. Evidence in Guidelines for Treatment of Coronary Artery Disease. *Adv Exp Med Biol.* 2020;1177:37-73. doi: [10.1007/978-981-15-2517-9\\_2](https://doi.org/10.1007/978-981-15-2517-9_2). PMID: 32246443.
9. López-Palop R, Moreu J, Fernández-Vázquez F, Hernández R; Hemodynamics and Interventional Cardiology Section of the Spanish Society of Cardiology. Spanish Registry of Hemodynamics and Interventional Cardiology. XIV Official Report of the Hemodynamics and Interventional Cardiology Section of the Spanish Society of Cardiology (1990-2004) [Spanish Cardiac Catheterization and Coronary Intervention Registry. 14th official report of the Spanish Society of Cardiology Working Group on Cardiac Catheterization and Interventional Cardiology (1990-2004)]. *Rev Esp Cardiol.* 2005 Nov;58(11):1318-34. English. PMID: [16324586](https://pubmed.ncbi.nlm.nih.gov/16324586/).
10. Martínez-Sánchez C, Jerjes-Sánchez C, Nicolau JC, Bazzino O, Antepara N, Mármol R; ACCESS Investigators. Acute coronary syndromes in Latin America: lessons learned from the ACCESS registry. *Rev Med Inst Mex Seguro Soc.* 2016 Nov-Dec;54(6):726-737. English. PMID: [27819783](https://pubmed.ncbi.nlm.nih.gov/27819783/).
11. Coronary artery surgery study (CASS): a randomized trial of coronary artery bypass surgery. Survival date.

circulation. 1983 Nov;68(5):939-50. doi:  
[10.1161/01.cir.68.5.939](https://doi.org/10.1161/01.cir.68.5.939). PMID: 6137292.

12. Kirschmann D, Paolantonio D. Rosario Registry of Hemodynamics and Interventional Cardiology. Year 2004. Official report of the Society of Cardiology of Rosario, Argentina. *Rev Fed Arg Cardiol* 2006; 35:31-36.

## Statements

### Ethics committee approval and consent to participate

The ethics committee of the Alcívar Hospital approved the study.

### Publication Consent

Not required when patient-specific images, radiographs, and studies are not published.

### Conflicts of interest

The authors declare they have no conflicts of interest.

### Author Information

**Eliezer Arellano Rojas**, Physician - University of Los Andes (Mérida-Venezuela, 2002). PostGraduate: Specialist in Cardiology- Institute of Cardiovascular Research Hospital Universitario de Los Andes (Mérida-Venezuela, 2007) Sub-Specialty: Master in Interventional Cardiology and Hemodynamics- Universidad Complutense de Madrid (Madrid-Spain, 2011). Training in Hemodynamics and Interventional Cardiology at the Hospital Clínica San Carlos (Madrid-Spain, 2009-2011). Email: [eliezerarellano24@hotmail.com](mailto:eliezerarellano24@hotmail.com)  
**ORCID** <https://orcid.org/0009-0001-5490-7375>

**Eduardo Barrio Nuñez**, Physician from the University of Guayaquil (Guayaquil, 2005). Medical specialist in hemodynamics, angiography, and interventional cardiology from the University of Buenos Aires (Buenos Aires, 2022). Email: [ebarriomd@gmail.com](mailto:ebarriomd@gmail.com)  
**ORCID** <https://orcid.org/0009-0003-6337-8641>

**Juan Pablo Masías Toapanta**, Physician from the Technical University of Ambato, (Ambato, 2017).  
Correo: [jpmasiascsz5@gmail.com](mailto:jpmasiascsz5@gmail.com)  
**ORCID** <https://orcid.org/0000-0001-9658-954X>

## Editor's Note

The Revista Actas Médicas (Ecuador) remains neutral regarding jurisdictional claims on published maps and institutional affiliations.

Received: February 9, 2023

Accepted: March 28, 2023

Published: June 12, 2023

Editor: Dra. Mayra Ordonez Martinez.

#### How to cite:

Arellano E, Barrio E, Masías J. Epidemiological characteristics of patients who required primary angioplasty. A single-center observational study. *Actas Médicas (Ecuador)* 2023; 33 (1): 4-10



Copyright 2023, Eliezer Arellano Rojas, Eduardo Barrio Nuñez, Juan Pablo Masías Toapanta. This article is distributed under the terms of the [Creative Commons CC BY-NC-SA 4.0 Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits noncommercial use and redistribution provided the source, and the original author is cited.

Correspondence: Eliezer Arellano Rojas, Mail: [eliezerarellano24@hotmail.com](mailto:eliezerarellano24@hotmail.com)

Address: Colonel 2301 and Azuay. Department of Cardiology, Hospital Alcívar, Guayaquil, Ecuador. Telephone: (5934) 3720100