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Epidemiological profile of acute myocardial infarction in Brazil between 2009 and 2019

Crossref doi 10.56238/homeinternationalanais-031

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Keywords: I myocardialnfarction, Indicadores health, Isnitters of morbidity and mortality, Hospitalization, Mortality.

1 INTRODUCTION

Acute myocardial infarction (AMI) is the syndrome with classical clinical manifestations, laboratory evidence of necrosis by ischemia of the heart muscle, and characteristic changes in electrocardiogram (ECG). AMI can be classified into several types according to electrocardiographic, pathophysiological, clinical, prognostic and etiological criteria, which is valid because it allows specific and more assertive interventions to be performed[1].

Since the 17th century, cases compatible with AMI have been described, but its initial recognition in a living patient was described only in 1896. Even though it was a fatal event whenever it happened, AMI was only considered a public health problem, being investigated and treated with greater caution from the early 1900s, where several researchers contributed reports to demonstrate the global importance of AMI [2].

In most cases, AMI occurs when an athesclerotic plaque ruptures, leading to coronary thrombosis and reduction of myocardial perfusion intense enough to cause necrosis of cardiac muscle tissue. The understanding of the pathophysiological process made known the various risk factors for AMI that can be categorized as: non-modifiable as age, sex and family history; modifiable such as smoking, alcohol consumption, sedentary lifestyle, obesity, hypertension, diabetes and dyslipidemias[3].

The classic clinical picture of AMI consists of angina, a deep, visceral, tightening or oppression chest pain (rarely in twinge or burning), located in the precordial region, which possibly radiates to the neck, jaw, upper limb, shoulder, or left hemibody scapula. Women, diabetics and the elderly are populations that may not present angina in the face of AMI, but rather anginal equivalents such as epigastralgia, nausea, vomiting, cold sweating and dyspnea[4].

The association between anginal pain or equivalent clinical picture, elevation of myocardial necrosis markers and electrocardiographic alterations are the three elements necessary to define the diagnosis of AMI. The ECG that should be performed within 10 minutes after admission of a patient with suspected AMI because it is enough to associate the clinical picture with the presence of elevation of the junction

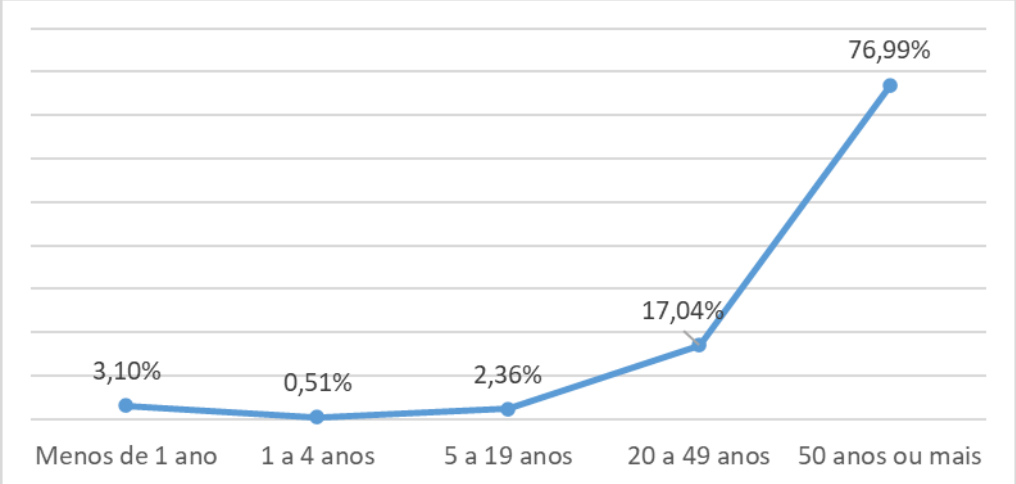
point between the QRS complex and the ST segment to define the diagnosis of AMI [5]. There are serum biomarkers that suggest myocardial necrosis and, even though they are important to differentiate unstable angina from AMI, are not essentially mandatory for the patient to start being treated early, considering that they have different levels of sensitivity and specificity[6].

Several patients with AMI develop complications such as complete atrioventricular block, Mobitz type II block and cardiogenic shock, a medical emergency whose mortality approaches 90% when untreated and 50% within 30 days, even early treated[7]. Acute and long-term mortality rates from AMI remain substantially high and are considered the most common cause of deaths worldwide. This situation is influenced by several factors, such as the availability of emergency medical care networks, delay in diagnosis and initiation of treatment with reperfusion therapy, percutaneous intervention, antithrombotic therapy and secondary prevention[8].

The United Nations proposed in 1950 the Swaroop-Uemura Index, a tool designed to quantify the overall levels of health of a place from the gross proportional mortality figures of people aged 50 and over. To complement, years later, the Nelson de Moraes Curve was created, which provides a graphical representation of proportional mortality data for all causes and age groups to assess the health level of a region[9].

Between 2009 and 2019 Brazil was excellent for general health care according to its Swaroop-Uemura index equal to 76.99% and the Nelson de Moraes Curve of type IV[10]. Thus, It is expected that Brazil has improved the management of AMI as well as other similar countries in terms of the general level of health to reduce the epidemiological impact of this disease[8].

Figure 1: Nelson de Moraes curve of Brazil between 2009 and 2019.



The present ecological study aimed to explore the epidemiological profile of AMI in Brazil between 2009 and 2019 from health indicators. Thus, evidence whether the management of this important disease was improved and its morbidity and mortality decreased during the time interval investigated.

2 METHODOLOGY

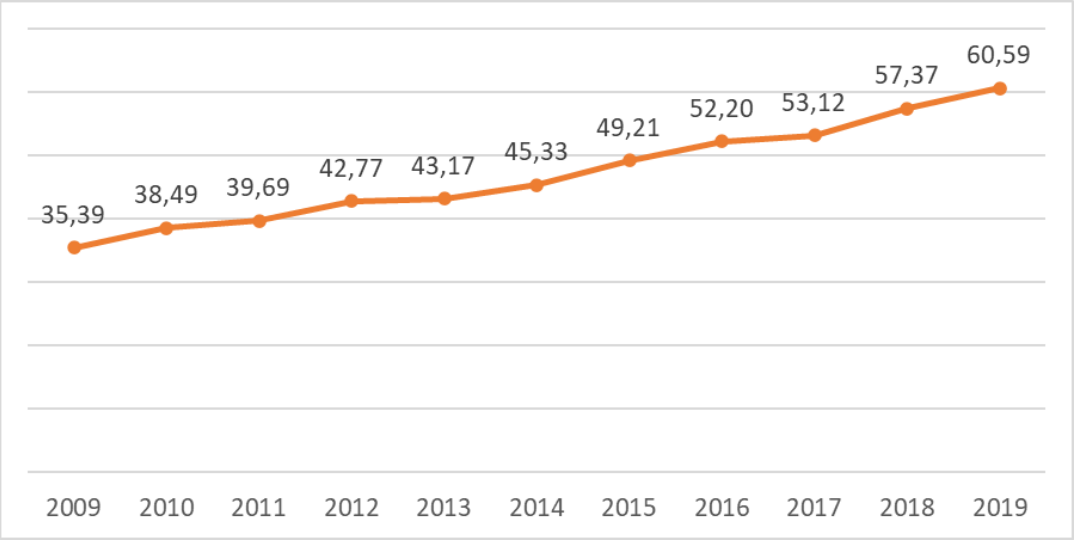
The study was elaborated from the Mortality Information System (SIM), SUS Hospital Information System (SIH/SUS) and Management of Studies and Analyses of Demographic Dynamics of the Ibge Research Directorate. In these information systems, the values of deaths per residence per year were collected according to region, age group and category of ICD-10 - I21 acute myocardial infarction; hospitalizations per year of care according to the Federation Unit and morbidity list of the ICD-10; resident population second year. The entire national territory and the years 2009 to 2019 were considered.

Based on the collected values, a researcher calculated the prevalence rates of hospitalizations, specific mortality and proportional mortality due to acute myocardial infarction so that, later, a comparative analysis of the values obtained could be performed.

3 RESULTS

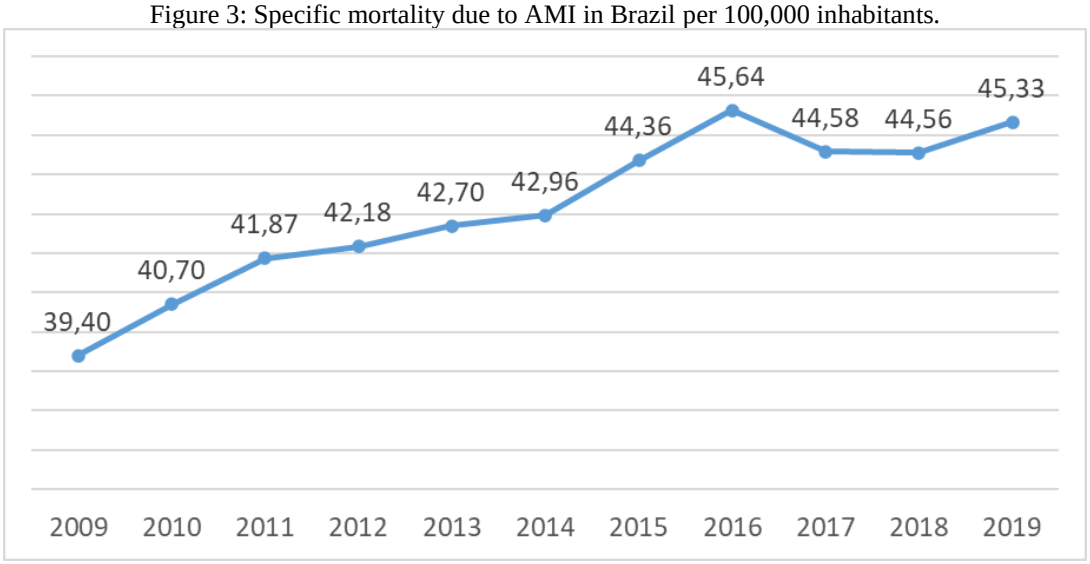
As 68,497 hospitalizations for AMI occurred in Brazil in 2009 and progressively higher values were found each year, considering the 75,244 hospitalizations in 2010, 78,353 in 2011, 85,222 in 2012, 86,795 in 2013, 91,912 in 2014, 100,617 in 2015, 107,577 in 2016, 110,304 in 2017, 120,010 in 2018 and 127,641 in 2019. The IBGE population estimate allows us to determine that 35.39 out of every 100,000 people were hospitalized for AMI in Brazil in 2009, a prevalence that also increased to reach values close to 60.59 hospitalizations per 100,000 inhabitants in 2019.

Figure 2. Prevalence of hospitalizations for AMI in Brazil per 100,000 inhabitants.



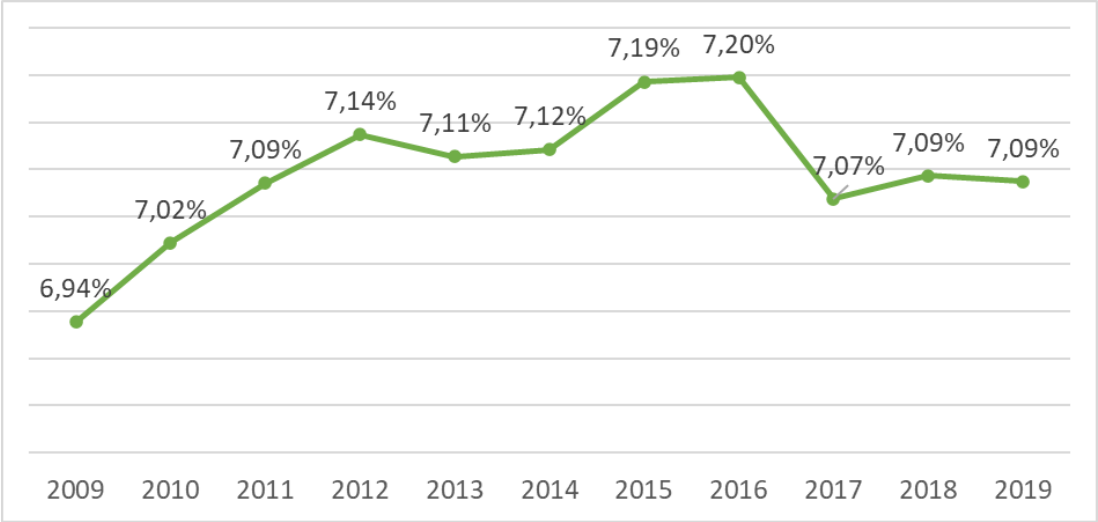
Of the 961,479 deaths from AMI recorded in the time interval, 76,258 occurred in 2009, 79,560 in 2010, 82,643 in 2011, 84,032 in 2012, 85,840 in 2013, 87,118 in 2014, 90,967 in 2015, 94,046 in 2016, 92,583 in 2017, 93,206 in 2018 and 95,496 in 2019. Thus, specific mortality from AMI varied between 39.40 in 2009 and 45.64 deaths per 100,000 inhabitants in 2016, decreased little until 2018 to rise again in 2019.

Figure 3: Specific mortality due to AMI in Brazil per 100,000 inhabitants.



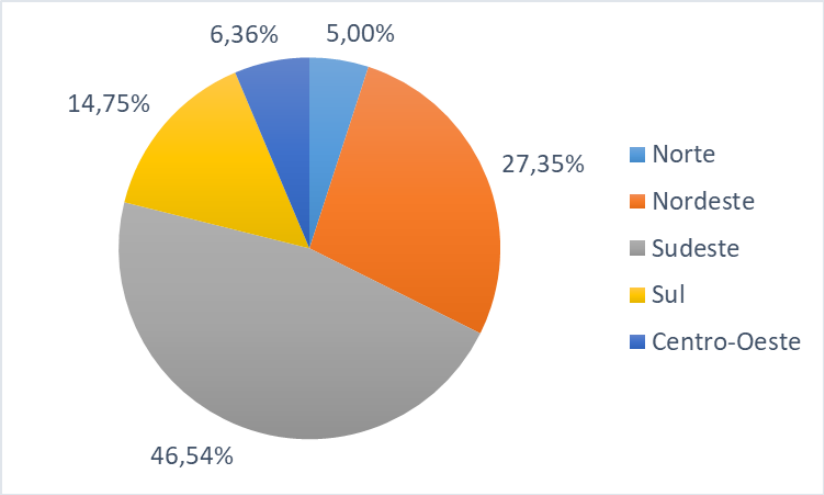
Proportional mortality from AMI increased from 6.94% in 2009 to 7.14% in 2012, then decreased to 7.11% in 2013 to rise successively to 7.20% in 2016. In 2017, AMI accounted for 7.07% of the causes of death in the country, while in the following two years it accounted for 7.09% of deaths.

Figure 4: Proportional mortality due to AMI in Brazil considering the cause.



Of the total number of people who died from AMI in the period evaluated, 58.92% were men (566,435) while 41.08% were women (394,958). 447,444 deaths occurred in the Southeast region, while in the Northeast region there were 262,930, another 141,831 in the South, 61,176 in the Midwest region and 48,098 in the North.

Figure 5: mortality ratio due to AMI in the region of the country of occurrence.



4 DISCUSSION AND CONCLUSION

The prevalence of hospitalizations due to AMI in Brazil increased every year between 2009 and 2019, which, despite suggesting an increase in the incidence of AMI, also indicates an optimization of access to emergency services with a consequent increase in the number of patients diagnosed with[AMI 8]. Although this seems ideal, it has an important economic repercussion considering the health costs due to hospitalization, as well as the psychosocial impact on each patient[13]. In addition, hospitalization for AMI is associated with a higher risk of rehospitalizations and new cardiovascular events with greater severity[14].

Mortality indicators should decrease over the years considering the country's high level of health, but this did not happen. Even with the decline in recent years, AMI is still responsible for a large proportion of the number of deaths in the country and this contrasts with what is expected, revealing that clinical management has not been improved enough to stabilize the number of deaths and lead to its reduction. To improve the profile, it is recommended to implement national health programs aimed at prevention, in addition to greater investments in technologies for diagnosis and more efficient treatment[15].

It is possible to conclude, therefore, that Brazil needs to invest in more efficient strategies for diagnosis and treatment of AMI, as well as in primary and secondary prevention measures, so that fewer people develop AMI and progressively lower numbers of deaths occur in the coming years.

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