

Outline of Hospitalization Due to Venous Thromboembolism in the State of Bahia – Brazil - between 2010 and 2020

Borges WR*

Vascular and Endovascular Surgeon, Department of Vascular and Endovascular Surgery of the Hospital Ana Neri, Federal University of Bahia, Salvador, State of Bahia, Brazil

*Corresponding author:

Wagner Ramos Borges,
Vascular and Endovascular Surgeon, Department of
Vascular and Endovascular Surgery of the Hospital
Ana Neri, Federal University of Bahia, Salvador,
State of Bahia, Brazil

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1. Summary

An important pathology that affects the cardiovascular system is venous thromboembolism (VTE), a disease characterized by the formation of clots in veins. VTE is divided into two clinical presentations: pulmonary thromboembolism (PT) and deep vein thrombosis (DVT). The general objective of this study is to describe the profile of patients hospitalized for venous thromboembolism and other venous diseases in the state of Bahia between 2010 and 2020. The specific objectives are: to describe the demographic characteristics of hospitalized patients; to describe the epidemiological trend of venous thromboembolism over the period. Based on data extracted from the SUS Hospital Information System (SIH/SUS), it was possible to analyze the following variables: annual frequency; race/color; sex; age range; health macro-region in the state of Bahia. Of the 21,450 hospitalizations for phlebitis, thrombophlebitis, embolism and venous thrombosis in Bahia, between 2010 and 2020, for patients aged 20 years and over, it was noted that 63.09% (13,533) are women, of which 42.14% (9,040) are self-declared as black or brown and that 43.39% (9,308) are concentrated in the East 2915 macro-region (NRS – SALVADOR). The profile of patients admitted between 2010 and 2020 was identified as being composed of brown women between 40 - 49 years old. ABSTRACT An important pathology that affects the cardiovascular system is venous thromboembolism (VTE), a disease characterized by the formation of clots in veins. VTE is divided into two clinical presentations: pulmonary thromboembo-

lism (PT) and deep vein thrombosis (DVT). The general objective of the present work is to describe the profile of patients hospitalized for venous thromboembolism and other venous diseases, in the state of Bahia between the years 2010 and 2020. The specific objectives are the following: describe the demographic characteristics of hospitalized patients; describe the epidemiological trend of venous thromboembolism over the period. Based on data extracted from the SUS Hospital Information System (SIH/SUS), it was possible to analyze the following variables: annual frequency; race/color; sex; age range; health macro-region of the state of Bahia. Of the 21,450 hospitalizations for phlebitis, thrombophlebitis, embolism and venous thrombosis in Bahia, between 2010 and 2020, for patients from 20 years of age, it was noticed that 63.09% (13,533) are women, of which 42.14% (9,040) are self-declared as black or brown and that 43.39% (9,308) are concentrated in the East 2915 macro-region (NRS – SALVADOR). The profile of patients admitted between 2010 and 2020 was identified as being composed of brown women between 40 - 49 years old.

2. Introduction

Diseases of the cardiovascular system have been seen as important factors in the population's illness for many years. According to data from the Ministry of Health, in 1999, such comorbidities led to around 1,100,000 hospitalizations through the Unified Health System [1]. Within this scenario, Venous Thromboembolism (VTE) stands out, a pathological condition marked by the development of a clot in veins, which leads to compromised blood circulation.

The physiological changes that precede venous thromboembolism are grouped by Virchow's Triad, which encompasses endothelial lesions, stasis or turbulent blood flow and blood hypercoagulability. Damage to the endothelial cell is a pro-coagulant factor, as it increases the expression of thrombomodulin, a thrombin modulating agent, stimulating platelet adhesion. Hemodynamic changes, such as stasis and turbulence, by modifying normal blood flow, stimulate the contact of platelets with the vessel endothelium and reduce the elimination of clotting factors, by reducing flow. The state of hypercoagulability, which can have hereditary and genetic causes, also promotes an imbalance between clotting factors by activating pro-coagulant substances and inhibiting anticoagulants.

Two VTE has two distinct clinical presentations, which are closely related: Deep Vein Thrombosis (DVT) and Pulmonary Thromboembolism (TEP) [3]. DVT consists of the formation of clots in the deep veins of the lower limbs, which have the potential to reach the pulmonary circulation [3]. This mechanism results in PTE, a condition marked by the migration of an embolus into the pulmonary circulation, which compromises the irrigation of this organ and is generally associated with a more serious situation [4]. The manifestations of Deep Vein Thrombosis are pain, heat, redness, edema of the affected limb, cramps and, in some cases, a greater predisposition to the formation of ulcers [2-5]. Edema, due to venous obstruction, is normally of the tense type, causing swelling, only in the calf or the entire affected leg. The redness, heat and pain in the area are caused by inflammation of the vessel wall. The pain may be permanent or related to orthostasis or physical effort, such as Hormans' sign, in which the foot is dorsiflexed to assess whether there is intense pain in the calf [6]. However, certain patients may not present symptoms or only some of them 5.

Pulmonary Embolism is characterized by different manifestations, which are: chest pain, generally of a pleuritic nature, tachypnea, dyspnea on exertion and in some cases cough 5. In more serious situations, dyspnea at rest, hypotension and syncope, due to low cardiac output and hypoxemia 5. Cases of pulmonary infarction are infrequent complications, and, when they exist, they are associated with extensive events and previous illnesses or comorbidities, such as lung infections and heart failure [7]. The diagnosis of venous thrombosis is complex, as no signs or clinical manifestations presented by the patient are predictive for confirmation or exclusion of table [8]. Therefore, the patient is classified according to the pre-test probability (i.e. [suspected presence of a certain disease based on anamnesis, physical examination findings and epidemiology [9]]) through validated risk assessment models for deep vein thrombosis or pulmonary embolism using the Wells or Geneva diagnostic criteria, which have similar diagnostic accuracy 10. These scores are important, as they eliminated situations of intermediate probability, characterizing patients dichotomously into situations of low probability ("probable PTE") and high probability ("unlikely PTE") [5,10]. This predictive model can be

complemented using other tests such as D-dimer. Its values can be measured in whole blood or plasma, however, it is important to note that complementary tests are only carried out when it is not possible to confirm the suspicion of VTE with clinical examination, which occurs in the majority of cases [11]. As it is highly sensitive (95%) 10, but not very specific (40%) 10 for VTE, its use is related to its high negative predictive value 5 (i.e. [probability of absence of disease when the test is negative]) [9]. Therefore, if the result is negative, the diagnosis of VTE can be excluded in patients with a low to moderate pre-test probability of DVT or embolism [5]. However, in situations where there is strong evidence of a case of VTE, treatment can be started even without the results of complementary exams [12]. Treatment consists of three main categories 13: medication (use of anticoagulants paying attention to the risk of bleeding 14) thrombolysis (through an injection of a substance into the bloodstream of the patient) [15,16] and filter in the vena cava (the insertion of devices in the inferior vena cava, being indicated for patients with DVT who cannot use anticoagulation) [17].

Thus, the presentation of signs and symptoms, which are often non-specific and common to other pathologies, as well as clinical diagnoses with specificity lower than 50%, lead to underreporting of the disease [18]. As a result, knowledge of the disease is significantly hampered. real incidence of venous thromboembolism.

Due to this worldwide epidemiological problem, estimating the prevalence of VTE is a challenging task, and for this reason, the numbers are variable. In the United States (USA), for example, it is estimated that the prevalence of PTE is between 3.4% and 14.8%, while in Asia, this number is around 2.0% to 4.7% [19]. In Brazil, in turn, the numbers that characterize the epidemiology of VTE are also not very precise. According to certain references, the incidence of the disease is 1 to 2 episodes per 1000 inhabitants 18, while others describe it as 0.6 per 1000 inhabitants [20].

The analysis of the relationships between VTE and different health variables also allows us to understand the impacts of this disease on the Brazilian population. From an epidemiological study carried out at the Hospital das Clínicas of the Federal University of Uberlândia, MG, between September and December 2005, it was concluded that the most frequent risk factors found for VTE were prolonged surgery (85.2%), anesthesia general (46.2%), aged 60 years or over (42.3%), prolonged bed restriction (27.4%) and aged between 40 and 59 years (24.9%) 20. So, you understand age and factors that promote immobility are crucial for the development of VTE. There are also the following variables intrinsically associated with the prevalence of VTE: obesity, increasing the risk by 2 to 3 times in cases of BMI greater than 30 kg.m²; [21] neoplasms, with a 5- to 7-fold increase in risk [22]; in addition to pregnancy (10-fold increase in risk) and the puerperium (25-fold) [23].

3. Objectives

Primary objective: to describe the profile of patients hospitalized for Venous Thromboembolism and other venous diseases, in the state of Bahia between 2010 and 2020.

Secondary objectives:

- Describe the demographic characteristics of hospitalized patients;
- Describe the epidemiological trend of Venous Thromboembolism over the period

4. Methods

The present work constitutes a descriptive observational study of secondary data, extracted from the SUS Hospital Information System (SIH/SUS), available in the DataSUS database, referring to patients hospitalized in Bahia between the years 2010 and 2020 according to the ICD chapter -10: IX. Diseases of the circulatory system, in the category of Phlebitis, thrombophlebitis, embolism and venous thrombosis.

The data obtained was then processed in Microsoft Excel software, where mean and median calculations were performed. This data can be verified through the TabNet portal, at the following access link: <https://datasus.saude.gov.br/>.

To describe the profile of hospitalizations, Venous Thromboembolism and associated conditions in Bahia, the variables used were:

- Annual frequency;
- Race/Color:
 - o the White;
 - o or Black;
 - o the Brown;
 - o the Yellow;
 - o the Brown;
 - o the Indigenous; It is
 - o No information.
- Gender:
 - o the Male;
 - o the Feminine; It is
 - o Ignored.
- Age range:
 - o 20 to 29 years old;
 - o 30 to 39 years old;
 - o 40 to 49 years old;
 - o 50 to 59 years old;
 - o 60 to 69 years old;
 - o 70 to 79 years old; It is
 - o 80 years and more.
- Health macro-region of the state of Bahia:

- o the North;
- o the Center-north;
- o the Northeast;
- o the East;
- o the Central-East;
- o the West;
- o the Southwest;
- o the South; It is
- o the Far-south.
- Regime
 - o Public services
 - o Private services

5. Results

Between 2010 and 2020, 21,450 hospitalizations for Phlebitis, Thrombophlebitis, Embolism and Venous Thrombosis were recorded across the state of Bahia, for patients aged 20 and over. The macro-region 2915 East (NRS - SALVADOR) had the highest number of hospitalizations, totaling 9,308 (43.39%), followed by regions 2910 South (NBS - ILHÉUS) and 2911 Southwest (NBS - VITÓRIA DA CONQUISTA) with 2,360 (11%) and 2303 (10.74%), respectively.

880 deaths were also reported throughout the period, led by 2915 LESTE - (NRS – SALVADOR) with 300 (Median (M) = 27; first quartile (Q1) = 23.5; third quartile (Q3) = 32.5), followed by 2910 SUL (NBS – ILHEUS) with 123 (M = 11; Q1 = 9; Q3 = 14) and 2917 CENTRO-EAST (NRS – FEIRA SANTANA) with 111 (M = 12; Q1 = 6.5; Q3 = 12.5). The trend of the curve over the period suggests stability, with an annual average of 80 deaths, with a peak of 97 deaths in 2019.

The general panorama of the period shows a significantly higher number of women hospitalized for phlebitis, thrombophlebitis, embolism and venous thrombosis, so that of the 21,450 hospitalized patients, 63.09% (13,533) are women and 36.91% are men (7,917). Men presented M = 717, with Q1 = 692 and Q3 = 727, and women M = 1173, with Q1 = 1145 and Q3 = 1261, demonstrating the difference in the absolute value of the cases.

The central tendency values also show the density of hospitalizations over the years, which indicates that there were no alarming fluctuations between groups or individuals of the same sex, except for the year 2019. 2630 hospitalizations were recorded, 905 of which were men (34.41%) and 1725 women (65.58%), absolute numbers that differ from the general average, male and female, respectively, of 1950, 719.73 and 1230.27.

When evaluating the data according to the race/color criterion, of the patients who had this information collected, the black population stands out, since in this category self-declared black and brown patients are considered, which totaled 9,040 (42.14%) in

the period studied. , followed by the white population with 1027 (4.79%). However, there is greater emphasis on patients whose race/color criteria were ignored, totaling 11,669 (54.4%) between 2010 and 2020.

The analysis based on the regime revealed that the sum of hospitalizations through public services (7391) significantly exceeds those through private services (3564). The numbers of hospitalizations in which the type of regime was not recorded were quite significant (11089). From 2010 to 2014, there were no records of hospitalizations classified as ignored. However, between 2016 and 2020, the nature of the regime was not distinguished in any hospitalization.

During the period in which the types of regimes were considered, the median number of hospitalizations under the public regime was 1247.5, while that under the private regime was 611.5. During the same period, the average number of hospitalizations under the public and private regime were, respectively, 1231.8 and 594.

Distribution by age group revealed a higher incidence among patients aged 40 to 49 years, with an annual average of 404.18 patients. Then, the groups from 50 to 59 years old (339.64) and 30 to 39 years old (327).

6. Discussion

The distribution by macro-regions reflects the impacts of disparities in sociodemographic factors, such as differences in income, access to health services, as well as the number of inhabitants in each region. According to the data obtained, the 2915 East macro-region (NRS – SALVADOR) stood out, in relation to the others, in terms of the number of hospitalizations, as well as the number of deaths (34%). This information is in line with results evidenced in the literature, which state that the Brazilian regions with the highest proportion of VTE hospitalization cases (south and southeast) have the lowest fatality rate due to the disease 19. It can be understood from this, that, despite the disparities regarding access to health and income being important, the significantly greater number of inhabitants of the macro-region 2915 Leste (NRS – SALVADOR) was able to determine it as being the leader in terms of the highest rates of hospitalization and death due to illness.

The profile in relation to gender corroborates the literature, since women correspond to the majority of hospitalizations. Intrinsic factors may be favorable to this arrangement, such as the use of oral contraceptives, possible pregnancy, postpartum period or gynecological surgery, as well as greater demand for health services by the female population compared to the male population 23, 24. Regarding the use of oral contraceptives, although the pills currently have a lower concentration of estrogen, especially ethinyl estradiol, their use increases the risk of VTE by up to six times compared to those who do not use hormonal-based contraceptives. The absolute risk, however, in women aged less than 35 years and without associated risk factors remains between low and moderate 25.

When analyzing the occurrence of this condition in relation to age, it is noted that the probability of involvement increases according to the patient's age, some authors consider that this growth has a direct relationship with longevity, however the analysis showed that this pattern is not directly proportional to the age factor 19. In research carried out by other researchers, it is noted that from the age of 40 19 the rate of occurrence increases considerably, with a greater risk, however other authors consider that this occurs from the age of 50 26. It is important to highlight that prophylactic methods are being developed with the aim of preventing the occurrence of DVT, as this is one of the causes of PE, a serious complication. Preventive diagnostic methods, especially in older patients and after surgical procedures, involve carrying out tests such as: daily gammagraphy with fibrinogen marked with I125 and ultrasound with Doppler, which is easier to perform, whereas the treatment uses anticoagulants, which have doubtful efficacy. as they increase the chances of bleeding 27.

The body of evidence, including the results of this work, suggests that VTE is more frequent in the population of African ancestry 28. Epigenetic factors help to justify this arrangement, such as obesity, which increases the risk two to three times, along with greater VTE activity. factor VIII in this ethnic group, which may favor thromboembolic events; 10% of healthy people have values above 228 IU/dl 29,30. However, the genetic basis of this increase in the population of African origin is still unknown.

During data collection, it was noticed that the MORB ICD-10 list studied does not distinguish reports of phlebitis and thrombophlebitis from those of embolism and venous thrombosis. This bias may have compromised the analysis of the data obtained, by including phlebitis and thrombophlebitis in the analyzed variables.

7. Conclusion

Venous thromboembolism is a recurrent condition in the in-hospital setting, and its complications are pathologies of high risk to the patient's health, with the associated risk factors determining the patient's prognosis. The study indicates that the hospitalization profile in the Bahian population is mainly composed of brown women, aged 40 to 49 years. In the territory of the state, Macro-region 2915 EAST - (NRS – SALVADOR) led the total number of assistances in the period. This secondary study, whose database comes from DataSUS, has limitations as it was made available by grouping four different pathologies into a single category, which allows for data imprecision and impacts the epidemiological design of Venous Thromboembolism in the Bahian population.

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