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Mortality In Children By Hemolytic Anemia In Brazil.

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ABSTRACT

Hemolytic anemias (HA) are characterized by reduced lifespan or degeneration of erythrocytes. There are several types and classifications of HA, which are defined based on their pathophysiological processes, which can affect children in different age groups and cause death. This study aimed to obtain infant mortality data for hemolytic anemia in Brazil. Thus, information on the epidemiological history (between 2015 and 2019) on the mortality of children aged 0-14 years old was collected in the Unified Health System database. These data were divided into several categories for analysis: geographic region, age group and type of hemolytic anemia (chapter III of ICD-10, D55-59). The analysis showed that mortality rates were higher in the northeast region (39.64%) and that the most vulnerable age group is 1-4 years old (40.29%). In addition, it was observed that hemolytic anemia classified as ICD-10 D57 is the main cause of death (71.29%). Although the data are not current, they present the Brazilian situation regarding hemolytic anemia in children.

Keywords: Hemolytic anemias; Mortality rate; Unified Health System; Children.

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INTRODUCTION

Anemia is a condition in which the number of red blood cells or the hemoglobin concentration within them is lower than normal. Anemia is a serious global public health problem that particularly affects young children and pregnant women. World Health Organization (WHO) estimates that 42% of children less than 5 years of age and 40% of pregnant women worldwide are anaemic [1].

Hemolytic anemias (HA) are defined as a group of anemias whose main characteristic is the decrease in erythrocyte survival. Although the time in the circulation to death for old or senescent red blood cells in adults is 110 to 120 days, and for hemolytic anemia is defined as an erythrocyte survival of less than 100 days [2]. There are several types and classifications of anemia. The occurrence of anemia is due to the various red cell defects such as production defect (aplastic anemia), maturation defect (megaloblastic anemia), defects in hemoglobin synthesis (iron deficiency anemia), genetic defects of hemoglobin maturation (thalassemia) or due to the synthesis of abnormal hemoglobin (haemoglobinopathies, sickle cell anemia and thalassemia) and physical loss of red cells (hemolytic anemias) [3,4].

HA is a condition in which red blood cells are destroyed and removed from the bloodstream before their normal lifespan is up. HA is a type of anemia due to hemolysis, the abnormal breakdown of red blood cells (RBCs), either in the blood vessels (intravascular hemolysis) or elsewhere in the human body (extravascular), and accounts for 5% of all existing anemias [3,5]. HA can affect people of all ages, races and sexes, leading to various health problems such as fatigue, pain, arrhythmias, an enlarged heart, and heart failure. Inherited HA include sickle cell anemia, thalassemias, hereditary spherocytosis, hereditary elliptocytosis, glucose-6-phosphate dehydrogenase (G6PD) deficiency, and pyruvate kinase deficiency. Acquired hemolytic anemias include immune hemolytic anemia, autoimmune hemolytic anemia, alloimmune hemolytic anemia, drug-induced hemolytic anemia, mechanical hemolytic anemias, paroxysmal nocturnal hemoglobinuria, certain infections and substances can also damage red blood cells and lead to hemolytic anemia [3,4].

The general classification of hemolytic anemia is either intrinsic or extrinsic, and the treatment depends on the type and cause of the hemolytic anemia [4]. The signs and symptoms of hemolytic anemia are similar to other forms of anemia (fatigue and shortness of breath), but in addition, the breakdown of red cells leads to jaundice and increases the risk of particular long-term complications, such as gallstones [4] and pulmonary hypertension [5]. In view of the high prevalence of anemia in children worldwide and the severity of the clinical condition in this population, it is important to have epidemiological knowledge of hemolytic anemia in Brazil so that new approaches and public health measures are proposed in order to avoid a bad prognosis.

MATERIALS AND METHODS

This is an exploratory, cross-sectional epidemiological study, carried out based on data on infant deaths from hemolytic anemia recorded in Brazil, from 2015 to 2019. For this purpose, were used public and official stroke hospitalization and death data extracted from the Information System on Mortality (*Sistema de Informação sobre Mortalidade* – SIM) and the Unified Health System Hospital Information System (*Sistema de informações Hospitalares do Sistema Único de Saúde* – SIH/SUS). Both platforms contain information available on the Unified Health System Department of Informatics (*Departamento de Informática do Sistema Único de Saúde* – DATASUS) [6].

Deaths recorded in the SIM have included in the study, with the cause of death recorded, according to the International Classification of Diseases, in its 10th revision (ICD-10), with codes included in D55-59, encompassing: D55 - Anemia Due to Disorders Enzymatic, D56 - Thalassemia, D57 - Sickle Cell Disorders, D58 - Other Hereditary Hemolytic Anemias, and D59 - Acquired Hemolytic Anemia.

Data collection and construction of the historical series, the years 2015 to 2019 were chosen because they are the 5 most recent for years with statistics available in DATASUS. In the DATASUS system, data have selected: region of occurrence, age group, chapter of the ICD-10 (III - hematological diseases of the blood and hematological organs and immune disorders); in content have selected death by occurrence; and in other selections it was selected in the option group ICD-10: Hemolytic anemias.

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RESULTS

Data on deaths from hemolytic anemia in Brazil have collected between 2015 and 2019, which is the last year available for consultation on DATASUS. In Brazil, according to chapter III of ICD-10, 882 records of infant deaths have found, being 158 (17.91%) in the north region, 329 (37.30%) in the northeast; 60 (6.8%) in the south; 266 (30.16%) in the southeast; and 69 (7.82%) in the midwest. Regarding the ICD-10 category, involving hemolytic anemia (ICD-10 D55-59), where 100 cases of children under 1 year old have observed, with 12 (12%) in the northern region; 43 (43%) in the northeast; 6 (6%) in the south; 31(31%) in the southeast; and 8 (8%) in the midwest.

However, when analyzing the data referring to mortality from hemolytic anemia in the age group of 0-14 years, 613 records were observed. In this period, there were 100 (16.31%) deaths in children under 1 year old; 247 (40.29%) in the age group 1-4 years old; 127 (20.72%) 5-9 years old; and 139 (22.67%) aged 10-14 years (Table 1). Of these, 68 (11.09%) were in the northern region; 243 (39.64%) in the northeast; 26 (4.24%) in the south; 206 (33.60%); in the southeast; 70 (11.42%) in the midwest. Table 1 shows that the age group with the highest number of deaths was 1-4 years old (247, 40.29%), followed by 10-14 years old (139, 22.67%). There was a higher frequency of mortality for CID-10 D57 (Sickle Cell Disorders), corresponding to 437 cases (71.29%) of deaths, being more prevalent in children aged 1-4 years (173, 39.59%) (Table 1). For the ICD-10 D55, there was a reduction in mortality in the period evaluated, corresponding to 0.98% of all deaths, and a higher predominance in the age group in children under 1 year old (66.67%). Deaths from the ICD-10 D56 also had a low occurrence, 1.14%, being more frequent in the age group of 1-4 years (57.14%). The 37.78% (17) of ICD-10 D58 deaths occurred in children under one year old; while for the ICD-10 D59 the number of deaths was higher for the age group of 1-4 years old (59, 50%), followed by those under 1 year old (34, 28.81%). These data indicate that for this ICD-10, 78.81% of deaths occurred in children under 4 years old (Table 1).

Table 1: Children mortality aged 0-14 years in Brazil due to ICD-10 hemolytic anemia, from 2015 to 2019. Source: MS/SVS/CGIAE - Mortality Information System-SIM, Brazil.

ICD-10	Ages group				Total
	< 1 (%)	1 – 4 (%)	5 – 9 (%)	10 – 14 (%)	
D55	4 (66.67)	0 (0)	1 (16.67)	1 (16.67)	6 (0.98)
D56	0 (0)	4 (57.14)	1 (14.28)	2 (28.57)	7 (1.14)
D57	45 (10.30)	173 (39.59)	110 (25.17)	109 (24.94)	437 (71.29)
D58	17 (37.78)	11 (24.44)	7 (15.55)	10 (22.22)	45 (7.34)
D59	34 (28.81)	59 (50.00)	8 (6.78)	17 (14.41)	118 (19.25)
Total	100 (16.31)	247 (40.29)	127 (20.72)	139 (22.67)	613 (100)

CONCLUSION

The data indicate that the age group 1-4 years old is the one with the highest number of deaths from hemolytic anemia. The records of infant mortality in Brazil due to hemolytic anemia occur mainly due to Sickle Cell Disorders (D-57). The limitation of data in this work refers to the updating of these records by the Ministry of Health of Brazil.

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