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# EPIDEMIOLOGICAL PROFILE OF HOSPITALIZATION FOR ACCIDENTAL POISONING DUE TO EXPOSURE TO ANALGESICS, ANTIPYRETICS AND NON-OPIATIVE ANTI-RHEUMATIC MEDICINE IN BRAZIL BETWEEN 2007 AND 2021

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**Abstract: Introduction**: Non-opiate analgesics, antipyretics and anti-rheumatics are among the most widely used drugs in the world, as they have symptomatic effects for practically all types of chronic or acute diseases. **Objective**: To describe the epidemiological profile of hospitalizations due to the accidental use of analgesics, antipyretics and anti-rheumatics. **Methodology**: This is a descriptive observational study, whose data were collected by the DataSUS platform. The collection started from the Hospital Information System (SIH), through hospital morbidity data by place of residence between January 2007 and December 2021. **Results and discussion**: The most affected region was the Southeast with 44.5% of all cases in the country, followed by the South, Northeast, Midwest and North regions, respectively. The study can see that the most affected national average age group is represented by two peaks: from one to four years of age and from 20 to 29. The female population represented more than 53% of the hospitalization cases and, when analyzing the color/ race of patients, the white population represented 48.79% of the cases, the brown and black 30% and 3.2%, respectively. **Conclusion**: The number of hospitalizations due to accidental use of these medications is still high, mainly because they are routine medications and need to have greater awareness on the part of the population.
**Keywords:** Intoxication, accidental poisoning, analgesics, antipyretics, anti-rheumatics

## INTRODUCTION

Intoxication is a condition resulting from exposure to substances of endogenous or exogenous origin that results in disturbances in the level of consciousness and physiological responses such as, for example, phlogistic signs. If exogenous, and by medication, the physiological response depends mainly on the

medication class, ingested dose and time in the body, being influenced by the individual's tolerance level. Often, a drug is administered to achieve a desired degree of therapy, but abuse can lead to intoxication.[1,2]

Most drug intoxications can cause sedation, drowsiness, mental confusion, respiratory depression, hypotension, tachycardia, seizures, muscle spasms and stiffness, vertigo, headache, loss of reflexes, in addition to being able to lead to death.[3] Non-opioid analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) are among the most used and/or prescribed drugs in the world, mainly because they have a symptomatic effect on inflammatory diseases or processes.[4]

In Brazil, the difficulty of accessing health services, especially for the most socially vulnerable population groups, contributes to the widespread use of these drugs.[5] They have a wide variety on offer with significant investment by the pharmaceutical industry for their prescription and use. These aspects contribute to the increase in cases and deaths due to drug intoxication. Therefore, in order to ensure that its use is safe, the participation of public agencies, as well as the private network, is essential. This study seeks to describe the epidemiological profile of hospitalizations due to poisoning by analgesics, antipyretics and anti-inflammatories in Brazil between 2007 and 2021.

## METHODOLOGY

This is a descriptive observational study, whose objective is to understand the epidemiological distribution of hospitalizations due to poisoning by analgesics, antipyretics and anti-inflammatories in Brazil. Data were collected by the DataSUS platform, through information collected by the Notifiable Diseases Information System (SINAN). The collection started from the Hospital Information System (SIH), through hospital morbidity data by place of residence between January 2007 and December 2021.6The information was characterized by regions of Brazil according to hospitalizations per year of care. The indicators used were: gender, age group, color/race, cost per hospitalization, type of network used by patients (public or private), deaths and mortality rates.

Considering that the information is publicly accessible and does not identify collective or individual data, this research did not need to be submitted to the local Research Ethics Committee (CEP), even though it considered the ethical principles contained in the Resolution of the National Health Council 466 /2012.

## RESULTS AND DISCUSSION

The National Health Surveillance Agency (Anvisa) calculated that, among deaths from poisoning in Brazil, 18% can be attributed to self-medication. In addition, 23% of cases of child poisoning are linked to the accidental ingestion of incorrectly stored medicines at home.[7] Access to pharmacies and drugstores and the ease of purchasing medicines at the popularly known "pharmacy counter" promote an increase in the consumption of medicines by the majority of the Brazilian population.

In Brazil, according to data from the Federal Council of Pharmacy, there is one pharmacy for every 2,700 inhabitants, a number very close to that of European countrie.[8] Furthermore, data from the Federal Council of Medicine indicate that 77% of Brazilians use medication without any medical advice.[9] Almost half (47%) self-medicate at least once a month, and 25% do it every day or at least once a week.[10]

The national consumption of medicines seems to be linked to three main factors:

difficult access to health services, the habit of Brazilians to self-medicate and the fact that some medicines are considered commodities that can be purchased and consumed under formal guidance. According to estimates by the World Health Organization (WHO), about 50% of drug users do it incorrectly.[11]

The consequences of the indiscriminate use of medication occur in the long and medium term: Painkillers, for example, do not cure migraine and can even make it worse; antipyretics can mask something more serious, like an infection; anti-inflammatories can overwhelm the kidneys.[12]

In Brazil, between 2007 and 2021, there were 3,033 hospitalizations due to intoxication due to the indiscriminate use of analgesics, antipyretics and non-opioid anti-rheumatics **Table 1.0**. The most affected region was the southeast with 44.5% of all cases in the country. According to the Brazilian Association of Distributors of National Laboratories (Abradilan), the South and Southeast regions were responsible for 70.5% of the consumption of these medicines, while the Midwest, North and Northeast regions were responsible for the consumption of 29.5 %.[13]

The second most affected region is the South with approximately 31% of cases, followed by the Northeast, Midwest and North regions, respectively. The most affected national average age group is represented by two peaks: from one to four years of age and from 20 to 29 **Table 2.0**. Furthermore, the age group between 30 and 49 years is also characterized by high rates of hospitalization. The elderly population, aged 60 or over, accounted for approximately 10.7% of admissions.

With regard to the cost per hospitalization of intoxicated patients, it is clear that the cost of care is relatively high and varies according to the different regions and age groups affected. The average Brazilian cost is R$ 408.10, ranging from R$ 338.59 in the North region, which has the lowest cost of hospitalization/inhabitant, up to R$ 504.58 in the South region, the one with the most expensive average **Table 3.0**.

Regarding age groups, the average cost of hospitalization in children under 1 years old is R$214.29. However, when we talk about the population between 30 and 39 years old, this value more than doubles to R$ 522.63. The average length of stay for these patients is 2.9 days. **Table 4.0** and demanded R$ 1,237,774.38 from the public coffers since 2007. Based on this analysis, it was possible to notice that with age, the average length of stay also increases, which may reflect greater severity of the condition in older patients. old; This group is often associated with comorbid conditions.

When analyzing the prevalence of hospitalizations by sex, there was a small difference between men and women. The female population represented approximately 53% of hospitalization cases and this average remained similar in almost all regions of the country **Table 5.0**. In the Northeast, the rate of women was the highest (61.4%). The only region in which the number of men was higher was the Southeast with a prevalence of 51.4%.

The color/race of the population also showed epidemiological discrepancy in this study. The white population represented 48.79% of the hospitalization cases, while the brown and black population represented 30% and 3.2%, respectively **Table 6.0**. It is inferred that for the medication ingestion accident to occur, these people need to have access to the medication. However, the average wage in Brazil differs in income for each type of population.

A survey released by the Brazilian Institute of Geography and Statistics (IBGE) shows that

| Region / Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL** | **21** | **334** | **287** | **245** | **180** | **171** | **144** | **186** | **188** | **176** | **178** | **238** | **286** | **212** | **187** | **3.033** |
| **North region** | 2 | 19 | 13 | 7 | 13 | 6 | 5 | 26 | 10 | 4 | 6 | 9 | 12 | 6 | 7 | 145 |
| **Northeast Region** | 2 | 25 | 53 | 50 | 52 | 27 | 20 | 20 | 15 | 18 | 16 | 22 | 28 | 15 | 10 | 373 |
| **Southeast region** | 5 | 127 | 122 | 117 | 82 | 86 | 72 | 68 | 99 | 83 | 89 | 140 | 127 | 70 | 64 | 1.351 |
| **South region** | 9 | 151 | 79 | 59 | 30 | 44 | 40 | 66 | 53 | 64 | 54 | 59 | 71 | 87 | 76 | 942 |
| **Midwest region** | 3 | 12 | 20 | 12 | 3 | 8 | 7 | 6 | 11 | 7 | 13 | 8 | 48 | 34 | 30 | 222 |

Table 1.0 Number of patients hospitalized for accidental poisoning due to exposure to analgesics, antipyretics, and non-opioid antirheumatics between 2007 and 2021 in Brazil.

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS). 2022.

| Region / Age group | Minor 1 year | 1 to 4 years | 5 to 9 years | 10 to 14 years | 15 to 19 years old | 20 to 29 years old | 30 to 39 years | 40 to 49 years old | 50 a 59 anos | 60 to 69 years | 70 a 79 anos | 80 years and over | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL** | **69** | **456** | **185** | **192** | **267** | **475** | **413** | **393** | **259** | **154** | **97** | **73** | **3.033** |
| **North region** | 1 | 23 | 16 | 17 | 10 | 24 | 16 | 16 | 12 | - | 7 | 3 | 145 |
| **Northeast Region** | 2 | 39 | 23 | 25 | 43 | 57 | 54 | 47 | 37 | 21 | 15 | 10 | 373 |
| **Southeast region** | 34 | 176 | 62 | 75 | 100 | 196 | 187 | 192 | 147 | 95 | 45 | 42 | 1.351 |
| **South region** | 23 | 153 | 57 | 62 | 99 | 181 | 130 | 111 | 53 | 30 | 27 | 16 | 942 |
| **Midwest region** | 9 | 65 | 27 | 13 | 15 | 17 | 26 | 27 | 10 | 8 | 3 | 2 | 222 |

Table 2.0 Number of patients by age group among hospitalizations for accidental poisoning due to exposure to analgesics, antipyretics, and non-opioid antirheumatics between 2007 and 2021 in Brazil.

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS). 2022.

| Region / Age group | Minor 1 year | 1 to 4 years old | 5 to 9 years | 10 to 14 years old | 15 to 19 years old | 20 to 29 years old | 30 a 39 anos | 40 to 49 years old | 50 to 59 years old | 60 to 69 years old | 70 to 79 years old | 80 years and more | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL** | **214,29** | **242,93** | **334,92** | **357,58** | **476,3** | **491,17** | **522,63** | **459,67** | **395,68** | **369,2** | **421,8** | **333,85** | **408,1** |
| **North region** | 136,95 | 412,91 | 362,69 | 329,93 | 139,8 | 662,18 | 211,48 | 141,19 | 242,54 | ... | 206,45 | 253,7 | 338,59 |
| **Northeast Region** | 401,43 | 169,19 | 271,9 | 221,89 | 672,86 | 589,47 | 178,2 | 556,62 | 251,61 | 185,96 | 252,06 | 289,82 | 368,4 |
| **Southeast region** | 198,86 | 213,76 | 356,75 | 304,99 | 441,27 | 465,72 | 418,94 | 259,44 | 371,67 | 377,03 | 312,54 | 345,96 | 349,36 |
| **South region** | 226,72 | 292,76 | 375,95 | 497,79 | 300,66 | 440,01 | 848,23 | 847,72 | 460,68 | 473,49 | 563,1 | 338,81 | 504,58 |
| **Midwest region** | 207,83 | 188,68 | 235,37 | 289,43 | 1.529,89 | 758,26 | 547,32 | 308,19 | 1.120,96 | 366,09 | 2.140,02 | 380,31 | 468,3 |

Table 3.0 Average cost of accidental poisoning due to exposure to analgesics, antipyretics and non-opioid anti-rheumatics between 2007 and 2021 in Brazil according to each age group in reais (R$).

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS). 2022.

| Region | Minor 1 year | 1 to 4 years | 5 to 9 years | 10 to 14 years | 15 to 19 years o | 20 to 29 years | 30 to 39 years | 40 to 49 years old | 50 to 59 years old | 60 to 69 years | 70 to 79 years old | 80 years and over | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL** | **2,3** | **2,1** | **2,7** | **2,6** | **2,7** | **2,9** | **3** | **3,5** | **3,3** | **3,5** | **4** | **4** | **2,9** |
| **North region** | 1 | 3 | 3,7 | 5 | 2,7 | 4,7 | 2,4 | 2,4 | 2,3 | ... | 3,4 | 1,7 | 3,4 |
| **Northeast Region** | 13 | 2,2 | 4,6 | 2,5 | 4,1 | 3,7 | 3,4 | 4,6 | 3,6 | 3,6 | 4,1 | 5,5 | 3,7 |
| **Southeast region** | 1,9 | 2,1 | 2,1 | 2,3 | 2,5 | 2,7 | 2,8 | 3 | 3,2 | 3,7 | 3,7 | 4 | 2,8 |
| **South region** | 2,1 | 2,2 | 2,5 | 2,5 | 1,9 | 2,5 | 3,2 | 4,3 | 2,6 | 3,2 | 4,3 | 3,9 | 2,8 |
| **Midwest region** | 1,8 | 1,4 | 2,4 | 1,8 | 5,5 | 3,4 | 2,5 | 2,6 | 8,1 | 2,1 | 6 | - | 2,6 |

Table 4.0 Average length of stay by age group of patients hospitalized for accidental poisoning due to exposure to analgesics, antipyretics and non-opioid anti-rheumatics between 2007 and 2021 in Brazil.

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS). 2022.

| Region | Masculine | Feminine | Total |
|---|---|---|---|
| **TOTAL** | **1.425** | **1.608** | **3.033** |
| North region | 66 | 79 | 145 |
| Northeast Region | 144 | 229 | 373 |
| Southeast region | 695 | 656 | 1.351 |
| South region | 419 | 523 | 942 |
| Midwest region | 101 | 121 | 222 |

Table 5.0 Distribution by sex among hospitalizations for accidental poisoning due to exposure to analgesics, antipyretics and non-opioid anti-rheumatics between 2007 and 2021 in Brazil.

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS). 2022.

| Region | White | black | Brown | Yellow | Indigenous | No information | Total |
|---|---|---|---|---|---|---|---|
| **TOTAL** | **1.480** | **97** | **911** | **14** | **7** | **524** | **3.033** |
| **North region** | 7 | 2 | 81 | 2 | 2 | 51 | 145 |
| **Northeast Region** | 30 | 20 | 241 | 3 | - | 79 | 373 |
| **Região Sudeste** | 634 | 55 | 456 | 5 | 5 | 196 | 1.351 |
| **South region** | 781 | 13 | 65 | 2 | - | 81 | 942 |
| **Midwest region** | 28 | 7 | 68 | 2 | - | 117 | 222 |

Table 6.0 Distribution by color/race among hospitalizations for accidental poisoning due to exposure to analgesics, antipyretics and non-opioid anti-rheumatics between 2007 and 2021 in Brazil.

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS). 2022.

white people have a monthly income almost twice as high as black people. Last year, while the average was R$3,099 for whites, it was R$1,764 for blacks and R$1,810 for browns. Inequality is also observed in the average household income per capita, of R$ 1,866 for whites, R$ 965 for blacks and R$ 945 for browns. Thus, access to medications is also unequal.[14]

Despite the number of people affected, the mortality rate is relatively low. The mortality rate between 2007 and 2021 was 1.48%. The highest number of deaths was in the age group above 80 years with nine patients **Table 7.0.** When analyzing the mortality rate by age group, there is a clear difference between each group. While in the group aged 30 to 39 years the rate was 0.24%, in those over 80 years it was 12.33%, demonstrating a direct relationship with age as a risk fator **Table 8.0**.

There is also a difference between mortality rates according to the regions of Brazil. Despite being the region with the highest number of hospitalizations, the Southeast had the lowest rate (1.11%), while the Northeast had a rate almost three times higher (3.21%). There was also a difference in the mortality rate between the services performed in the public and private network. In the public network there was a 27% higher death rate compared to the private **Table 9.0**.

Analgesics and antipyretics, especially dipyrone and paracetamol, are medications constantly used for the symptomatic treatment of viral syndromes. In 2017, the use of medication was the main cause of

| Region | 1 to 4 years | 15 to 19 years old | 20 to 29 years old | 30 to 39 years old | 40 to 49 years old | 50 to 59 years old | 60 to 69 years old | 70 to 79 years old | 80 years and over | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL** | **4** | **7** | **5** | **1** | **6** | **3** | **8** | **2** | **9** | **45** |
| **North region** | 1 | - | 1 | - | - | - | - | - | - | 2 |
| **Northeast Region** | - | 3 | 1 | - | 2 | - | 5 | - | 1 | 12 |
| **Southeast region** | 1 | - | 2 | - | 3 | 2 | 2 | - | 5 | 15 |
| **South region** | - | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 11 |
| **Midwest region** | 2 | 1 | - | - | - | - | - | 1 | 1 | 5 |

Table 7.0 Distribution of deaths by age group among hospitalizations due to accidental poisoning due to exposure to analgesics, antipyretics and non-opioid anti-rheumatics between 2007 and 2021 in Brazil.

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS). 2022.

| Region | 1 to 4 years | 15 to 19 years | 20 to 29 years | 30 to 39 years | 40 to 49 years | 50 to 59 years | 60 to 69 years | 70 to 79 years | 80 years and over | General rate |
|---|---|---|---|---|---|---|---|---|---|---|
| **TOTAL** | **0,88** | **2,62** | **1,05** | **0,24** | **1,53** | **1,16** | **5,19** | **2,06** | **12,33** | **1,48** |
| **North region** | 4,17 | - | 4,17 | - | - | - | ... | - | - | 1,37 |
| **Northeast Region** | - | 6,98 | 1,72 | - | 4,26 | - | 23,81 | - | 10 | 3,21 |
| **Southeast region** | 0,57 | - | 1,02 | - | 1,56 | 1,36 | 2,11 | - | 11,9 | 1,11 |
| **South region** | - | 3,06 | 0,56 | 0,77 | 0,9 | 1,89 | 3,33 | 3,7 | 12,5 | 1,17 |
| **Midwest region** | 3,13 | 6,25 | - | - | - | - | - | 33,33 | 50 | 2,25 |

Table 8.0 Mortality rate by age group among hospitalizations due to accidental poisoning due to exposure to analgesics, antipyretics and non-opioid anti-rheumatics between 2007 and 2021 according to regions of Brazil.

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS). 2022.

| Region | Public | Private | Ignored | Overall Mortality Rate |
|---|---|---|---|---|
| **TOTAL** | **1,4** | **1,1** | **1,82** | **1,48** |
| **North region** | 1,19 | - | 2,22 | 1,38 |
| **Northeast Region** | 3,85 | 1,09 | 6,31 | 3,22 |
| **Southeast region** | 0,4 | 0,99 | 1,51 | 1,11 |
| **South region** | 0,77 | 1,16 | 1,42 | 1,17 |
| **Midwest region** | 7,32 | 2,5 | 0,71 | 2,25 |

Table 9.0 Mortality rate by type of health service among hospitalizations due to accidental poisoning due to exposure to analgesics, antipyretics and non-opioid anti-rheumatics between 2007 and 2021 according to the regions of Brazil.

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS). 2022.

intoxication in Brazil (27.1%), higher among children under one year old (38.9%) and between one and four years old (33.5%), representing almost 12 intoxicated children every day in the country. The most common medications in self-medication in Brazil, according to ICTQ (Research and Graduate Institute), in 2018, were: analgesics (48%), anti-inflammatories (31%), muscle relaxants (26%), antipyretics (19%), nasal decongestants (15%), expectorants (13%), antacids (10%) and antibiotics (10%).[15]

The use of medications without an adequate dosage can have several consequences for the patient's body. Many people know empirically that paracetamol can be used to control fever and muscle pain, however, they do not know that after a certain level it is an extremely hepatotoxic medication. The maximum recommended dose is 4000 mg per day, which is easily achievable if the individual takes 2 pills of 500 mg every 6 hours. In a study of 201 patients hospitalized for poisoning due to the use of analgesics, paracetamol was responsible for 61% of the cases. Thus, even the most routine medications must have their doses measured.[12]

## CONCLUSION

Non-opioid analgesics are among the most used and prescribed drugs in the world, mainly because they have a symptomatic effect on the diseases or inflammatory processes for which they are indicated. Thus, the accidental use of these medications that cause hospitalizations is frequent. The most affected region in the period from 2007 to 2021 was the Southeast with 44.5% of all cases in the country. The second most affected region is the South, followed by the Northeast, Midwest and North regions, respectively.

The study can see that the national average age group most affected is represented by two peaks: from one to four years of age and from 20 to 29. Also, the female population represented approximately 53% of hospitalization cases. Finally, the color/race of the population also showed epidemiological discrepancy in this study. The white population represented 48.79% of the hospitalization cases, while the brown and black population represented 30% and 3.2%, respectively.

## CONFLICT OF INTERESTS

None.

## FINANCING

Own of researchers.

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