High prevalence of drug intoxication in individuals aged 0 to 12 years in Brazil

Alta prevalência de intoxicações medicamentosas em indivíduos de 0 a 12 anos no Brasil

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ABSTRACT
Drug intoxications are associated with the pattern of drug consumption in Brazil. In childhood, these events occur frequently and help to increase infant mortality. To control these episodes, the Brazilian Ministry of Health instituted the National System of Toxic-Pharmacological Information to assist in obtaining and understanding data on this problem. In this context, this study aims to analyze cases of drug intoxication in Brazil in patients aged 0 to 12 years, registered by the National System of Toxic-Pharmacological Information. This is an exploratory-descriptive and cross-sectional study, with a quantitative approach, in which secondary data from the drug intoxication record in individuals aged 0 to 12 years, available at
SINITOX, during the period from 2016 to 2021, were analyzed. Of 24,438 cases of drug intoxication in individuals of both sexes, aged 0 to 12 years, were reported during the period from 2016 to 2021 in Brazil and 87.7% of cases were due to accidental intoxication. Because of this, preventive actions and health education aimed at the rational use of medicines and the reduction of impacts that the erroneous use must be necessary to favor a better and higher quality of life for the Brazilian population.

**Keywords:** intoxication, medicines, infancy, rational use of medicines.

**RESUMO**
As intoxicações medicamentosas estão associadas com o modelo de consumo de medicamentos no Brasil. Na infância, esses acontecimentos ocorrem com frequência e auxiliam para elevar a mortalidade infantil. A fim de realizar o controle desses episódios, o Ministério da Saúde do Brasil instituiu o Sistema Nacional de Informações Tóxico-Farmacológicas para auxiliar na obtenção e entendimento dos dados sobre esse problema. Neste contexto, esse estudo possui como objetivo analisar os casos de intoxicação por medicamentos no Brasil em pacientes de 0 a 12 anos, registrados pelo Sistema Nacional de Informações Tóxico-Farmacológicas. Trata-se de um estudo exploratório-descritivo e transversal, de abordagem quantitativa, em que foram analisados dados secundários do registro de intoxicação por medicamentos em indivíduos de 0 a 12 anos, disponíveis no SINITOX, durante o período de 2016 a 2021. Um total de 24.438 casos de intoxicação medicamentosa em indivíduos de ambos os sexos, com idade de 0 a 12 anos, foram reportados durante o período de 2016 a 2021 no Brasil e 87,7% dos casos foram por intoxicação acidental. Por conta disso, ações preventivas e de educação em saúde que visam o uso racional de medicamentos e a redução dos impactos que a utilização errônea há de ser necessária para favorecer uma melhor e maior qualidade de vida a população brasileira.

**Palavras-chave:** intoxicação, medicamentos, infância, uso racional de medicamentos.

**1 INTRODUCTION**
Medicines have prophylactic, curative, palliative or diagnostic activities and are intended to favor those who use them (GONÇALVES et al., 2017). Thus, these products are responsible for a large part of expenditures in the health sector, both public and complementary. However, since 1994, these substances expose the first positions among intoxications, resulting in an average of 25% of the cases registered in the country (MATHIAS et al., 2019).

Episodes of drug intoxication are probably associated with the model of drug consumption in Brazil (OLIVEIRA et al., 2017). In childhood, these events occur frequently and help to increase infant mortality. Thus, intoxications reach a worrying proportion and symbolize one of the fundamental types of accidents involving the child population (ORNILLO et al., 2020). According to Sereno et al. (2020), drug poisoning in children is motivated by three reasons: childhood, society, and the state. The first portrays children's natural curiosity, lack of awareness and danger and not very advanced taste. The second occurs due to self-medication, improper storage, and lack of guidance regarding rational use. About the State, it is mentioned
the difficult access to health centers and the creation of laws that provide for more precise inspections.

In order to control these episodes, since 1980, the Brazilian Ministry of Health has instituted the National System of Toxic-Pharmacological Information (SINITOX), with the idea of filling the demand for greater national acquisition of knowledge in toxicology and pharmacology, to that, therefore, it could cooperate with the understanding of data on the toxic effects of drugs and other existing toxic agents, to which the population is exposed (SILVA et al., 2021).

Considering that the analysis of this information makes it possible to carry out epidemiological studies in the conception of representativeness and elucidation of profiles of cases of drug intoxication and poisoning, with great relevance for public health. In this sense, the present study aimed to carry out the analysis of cases of drug intoxication in Brazil in patients aged 0 to 12 years, registered by SINITOX.

2 METHODS

This is an exploratory-descriptive and cross-sectional study, with a quantitative approach, in which secondary data from the drug intoxication record in individuals aged 0 to 12 years, available at SINITOX, during the period from 2016 to 2021 were analyzed. the following criteria: accidental intoxication, self-medication, prescription error, administration and by age group by regions of Brazil (SILVA et al., 2021).

The data were tabulated using the Excel® program to prepare the tables and carry out the absolute (n) and relative (%) frequency calculations for further analysis.

3 RESULTS

A total of 24,438 cases of drug intoxication in individuals of both sexes, aged 0 to 12 years, were reported during the period 2016 to 2021 in Brazil. Circumstances of intoxications by age group are described in Table 1.

<table>
<thead>
<tr>
<th>Circumstance</th>
<th>&lt; 1 year</th>
<th>1 to 4 years</th>
<th>5 to 9 years</th>
<th>10 to 12 years</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidental</td>
<td>1,125</td>
<td>15,467</td>
<td>3,683</td>
<td>1,179</td>
<td>21,454</td>
</tr>
<tr>
<td>Self medication</td>
<td>152</td>
<td>324</td>
<td>358</td>
<td>963</td>
<td>1,797</td>
</tr>
<tr>
<td>Prescription and/or administration error</td>
<td>495</td>
<td>26</td>
<td>416</td>
<td>250</td>
<td>1,187</td>
</tr>
<tr>
<td>Total</td>
<td><strong>1,772</strong></td>
<td><strong>15,817</strong></td>
<td><strong>4,457</strong></td>
<td><strong>2,392</strong></td>
<td><strong>24,438</strong></td>
</tr>
</tbody>
</table>
Overall, 87.7% of cases were due to accidental intoxication. In addition, the states of the Southeast, Northeast and South, together, were responsible for 18,553 of the total notifications and the most prevalent age group was 1 to 4 years. The investigative aspects are presented in Table 2.

Table 2: Cases of accidental drug intoxication by region of Brazil.

<table>
<thead>
<tr>
<th>Region</th>
<th>&lt; 1 year</th>
<th>1 to 4 years</th>
<th>5 to 9 years</th>
<th>10 to 12 years</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>47</td>
<td>651</td>
<td>153</td>
<td>37</td>
<td>888</td>
</tr>
<tr>
<td>North East</td>
<td>231</td>
<td>3,584</td>
<td>971</td>
<td>284</td>
<td>5,070</td>
</tr>
<tr>
<td>Southeast</td>
<td>473</td>
<td>6,466</td>
<td>1,526</td>
<td>284</td>
<td>8,749</td>
</tr>
<tr>
<td>South</td>
<td>249</td>
<td>3,325</td>
<td>771</td>
<td>389</td>
<td>4,734</td>
</tr>
<tr>
<td>Midwest</td>
<td>125</td>
<td>1,441</td>
<td>262</td>
<td>185</td>
<td>2,013</td>
</tr>
<tr>
<td>Total</td>
<td>1,125</td>
<td>15,467</td>
<td>3,683</td>
<td>1,179</td>
<td>21,454</td>
</tr>
</tbody>
</table>

Tables 3 and 4 describe the reported cases of drug intoxication due to self-medication and due to prescription and/or administration errors, respectively. These two characteristics accounted for approximately 12.2% of all cases. It is noted that people aged 10 to 12 years were the ones who were most intoxicated by self-medication in Brazil and individuals aged 0 to 9 years were the most susceptible to prescription errors and/or medication administration. This information is present in Tables 3 and 4.

Table 3: Cases of drug intoxication by self-medication by region of Brazil.

<table>
<thead>
<tr>
<th>Region</th>
<th>&lt; 1 year</th>
<th>1 to 4 years</th>
<th>5 to 9 years</th>
<th>10 to 12 years</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>12</td>
<td>24</td>
<td>17</td>
<td>31</td>
<td>84</td>
</tr>
<tr>
<td>North East</td>
<td>50</td>
<td>127</td>
<td>127</td>
<td>270</td>
<td>574</td>
</tr>
<tr>
<td>Southeast</td>
<td>56</td>
<td>106</td>
<td>137</td>
<td>430</td>
<td>729</td>
</tr>
<tr>
<td>South</td>
<td>22</td>
<td>41</td>
<td>59</td>
<td>196</td>
<td>318</td>
</tr>
<tr>
<td>Midwest</td>
<td>12</td>
<td>26</td>
<td>18</td>
<td>36</td>
<td>92</td>
</tr>
<tr>
<td>Total</td>
<td>152</td>
<td>324</td>
<td>358</td>
<td>963</td>
<td>1,797</td>
</tr>
</tbody>
</table>

Table 4: Cases of drug intoxication due to prescription and/or administration errors by region of Brazil.

<table>
<thead>
<tr>
<th>Region</th>
<th>&lt; 1 year</th>
<th>1 to 4 years</th>
<th>5 to 9 years</th>
<th>10 to 12 years</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>15</td>
<td>-</td>
<td>10</td>
<td>12</td>
<td>37</td>
</tr>
<tr>
<td>North East</td>
<td>72</td>
<td>10</td>
<td>95</td>
<td>41</td>
<td>218</td>
</tr>
<tr>
<td>Southeast</td>
<td>210</td>
<td>8</td>
<td>168</td>
<td>127</td>
<td>513</td>
</tr>
<tr>
<td>South</td>
<td>146</td>
<td>5</td>
<td>105</td>
<td>58</td>
<td>314</td>
</tr>
<tr>
<td>Midwest</td>
<td>52</td>
<td>3</td>
<td>38</td>
<td>12</td>
<td>105</td>
</tr>
<tr>
<td>Total</td>
<td>495</td>
<td>26</td>
<td>416</td>
<td>250</td>
<td>1,187</td>
</tr>
</tbody>
</table>

4 DISCUSSION

Intoxication is a pathological development produced by endogenous or exogenous substances, described by physiological imbalance, resulting from biochemical changes in the organism (ALMEIDA et al., 2022). One of the relevant reasons for intoxication in the world is medication. They are part of the second cause of mortality related to poisoning, which
constitutes a great social and economic impact (EGÍDIO et al., 2021). In this study, the causes, and numbers of notified cases of drug intoxication in patients aged 0 to 12 years in Brazil were identified.

Accidental intoxication was the most frequent in the investigated sample, corroborating other studies carried out in the country, which also found the predominance of accidental use of medicines as a causative factor for this fact (FRANCISCO et al., 2016; LIMA et al., 2021; FREITAS et al., 2022). These studies point out that these events can occur intentionally or accidentally, when they come from self-medication, dosage error, inadequate therapy, medication change or involuntary ingestion; or international, when relevant to abuse, misuse, or self-injury (MARQUES, 2021). On the other hand, results indicate that the use of medicines under the guidance of trained professionals such as doctors and pharmacists, the legibility of the prescription, the handling of medicines in bright places and the storage of products in adequate environments, considerably minimizes the rate of accidental intoxication by pharmaceutical products (TEIXEIRA et al., 2021). Therefore, there is a need to employ more educational actions with the population to avoid these disorders, which are still considered a serious public health problem in Brazil today (SOARES et al., 2021).

Additionally, the age group from 1 to 4 years was the most affected for this reason. The literature states that the accidental use of medication is the main reason for intoxication in children, with 95% of them occurring due to self-administration of medication or toxic items captured by the children themselves in the home environment (TIMÓTEO et al., 2020; THOMAZIN et al., 2022). Other products more commonly included in these intoxications are soaps, lotions, plants, products related to the use of diapers (eg: ointments for diaper rash, powders, etc.), medicines for the stomach, coughs or colds, antifungal creams and paracetamol (ARAÚJO et al., 2020). Therefore, it is necessary that medicines and other toxic goods are packaged out of reach and sight of children and babies who can already reach them, since curiosity, common in this age group, can lead to the accidental use of these products (MATHIAS et al., 2019).

Self-medication is also one of the most common reasons for intoxication in Brazil (OLIVEIRA et al., 2020). This process consists of ingesting a medication on your own and without instruction by a qualified professional. This fact is constantly seen as a resource for the immediate relief of some symptoms (ABDIN et al., 2020). Academic studies show that 35% of drugs are used for self-medication and analgesics and antipyretics, for pain and fever relief, are the most sought after. Thus, the wrong use of drugs, in addition to masking the symptoms, can harm the health of the population (ANDERSON et al., 2019; AQUINO et al., 2020).
Medication errors are avoidable and preventable, and the administration of these products is the most important activity for the safe and rational use of medications (BARBERATO et al., 2019). Thus, being the last opportunity to prevent and prevent a possible error made in the previous steps and becoming a necessary obstacle capable of hindering medication errors arising from the prescription and dispensing processes (DIAS et al., 2019; FRANÇA et al., 2021).

In the study, it was possible to verify that 1,187 cases were reported in Brazil during the study period. Aquino et al. (2020) claims that the absence of patient and drug recognition can lead to medication administration to patients in the wrong way. As a result, this lack of information can facilitate the occurrence of errors when beds are changed or even when the patient is discharged from the hospital, for example (MELO et al., 2020). In this context, problems and failures to be overcome require the knowledge that every health care action has unstable points that can harm patient safety and to contain the risk it is necessary to create an environment of surveillance and cooperation of the multidisciplinary team (PAES et al., 2018; MENDES et al., 2019).

Furthermore, the Northeast, Southeast and South regions exhibited the highest rates of drug intoxication in the different age groups of the study. These data were also evidenced by Paula et al. (2021). There are indications in Brazil of the link between greater purchasing power and greater use of medication, which may be a reason for the higher and increasing rates of drug intoxication in the Southeast and South regions of the country (ROCHA et al., 2020). In addition, the Northeast of Brazil also exposed a strong number of cases, which may be due to the unfolding of inequalities in the availability and access to medicines by the populations residing in these areas (SOARES et al., 2020). Thus, there are several cases of irrational use of drugs that can result in cases of poisoning in these regions. So, this may be one of the reasons responsible for the maintenance of the incidence of intoxications and the increase in mortality in cases of drug intoxication in Brazil (SOUZA et al., 2018; ROCHA et al., 2020).

5 CONCLUSION

The irrational use of medicines still represents a serious public health problem in Brazil. Over the years evaluated, it was feasible to observe 24,438 occurrences of intoxication in patients aged 0 to 12 years, resulting from accidental use, self-medication and/or errors in the prescription or administration of these substances, in all four quants in the country. Because of this, preventive actions and health education aimed at the rational use of medicines and the
reduction of impacts that the erroneous use must be necessary to favor a better and higher quality of life for the Brazilian population.
REFERENCES


