



Prevalence of neurological symptoms in neonates with withdrawal syndrome. A single-center observational study.

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Abstract

Introduction: Neonatal withdrawal syndrome is a growing problem worldwide caused by the significant increase in drug use. It is characterized by neurological symptoms such as acute crying, trembling, seizures, lethargy, a moro reflex, and hypertonia up to two weeks of age. The objective of this study was to measure the prevalence of withdrawal syndrome in children of mothers who consume.

Methodology: This study is a prevalent, descriptive, and observational type, utilizing a database from the Liborio Panchana Sotomayor General Hospital as the primary source of information. All patients who received the final diagnosis were included in “withdrawal syndrome” during the study period.

Results: A total of 34 neonates with withdrawal syndrome were registered; 64.71% were male, the mean age at which clinical manifestations occurred was 1.35 days, and acute crying was the most frequent symptom in 29.41% of the cases. The substance used by pregnant women was “H”, the frequency of which was 91.2% of all cases.

Conclusions: These results confirm the importance of establishing timely detection and management protocols to ensure adequate treatment of neonates at risk, thus addressing a growing public health problem.

Keywords:

Neonatal withdrawal syndrome, Pregnancy, Drugs, Neonates, High-pitched crying, Neurological symptoms.

Abbreviations

Drug H: Ecuadorian artisanal drug, a mixture of heroin, diazepam, and fentanyl in variable proportions.

Supplementary information

No supplementary materials are declared.

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Authors' contributions

Janeth Michell Neder Chusán: Conceptualization, Research, Writing - original draft, Resources, Software, Supervision.

Santiago Javier Peña Sempértegui: Conceptualization, research, writing - original draft, resources, software, supervision.

Rovel Belizario Mena Bonilla: Methodology, Data curation, Formal analysis, Fund acquisition, Project management, Validation, Visualization, Drafting - review and edition.

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Availability of data and materials

The datasets used and analyzed during the present study are available from the corresponding author upon reasonable request.

Introduction

Worldwide, the rising use of drugs is becoming a social and public health issue, as it is the main cause of neonatal withdrawal. This syndrome often occurs in children of mothers who use drugs, so it should always be assessed in the neonatology department when this history is present. Abstinence in neonates typically shows as adrenergic overactivation, tremors, vomiting, and irritability—symptoms that can appear within the first two weeks after birth but are more common between the third and fourth days of life. About 35% of neonatal withdrawal syndrome is caused by maternal opiate use [1, 2].

In 2018, a study conducted at the University Hospital reported the prevalence of seven key symptoms in neonates with withdrawal syndrome. In 81% of cases, neonates showed excessive suction; 74% had loose stools; 71% exhibited marbled skin; 69% experienced sweating and excessive crying; 52% had regurgitation; and 48% displayed mild tremors on stimulation [3].

A study conducted in 2020 at Francisco de Icaza Bustamante Hospital found that the most common neurological issues included generalized seizures, myoclonic jerks, excessively high-pitched crying, persistent high-pitched crying, the Moro reflex, tremors, muscular hypertonia, and abrasions. The study results showed that 60% of the cases exhibited irritability. Less than 50% of the cases experienced tremors, vomiting, fever, and finally, respiratory distress, which accounted for 24% of the neonates studied [4].

A study conducted in 2021 at the Guasmo Sur General Hospital revealed that the newborns affected with neonatal abstinence syndrome were mainly male (61%). It was born between the first and third days after birth (43% of the total), and for obvious reasons, the diagnosis could be verified in the first three days. Similarly, the type of drug consumed by the mothers was evaluated, and the results revealed that most of them used cocaine (40%), heroin (34%), or marijuana (18%). The cardinal manifestations present in these neonates were irritability, tremors, and drowsiness. To evaluate their prognosis, the Finnegan scale was used for diagnosis, which revealed that the majority of neonates experienced mild withdrawal (79%), and only 9% experienced severe disease [5].

Therefore, we believe it is important to conduct a study to determine the prevalence of neurological symptoms in neonates with withdrawal syndrome at the Liborio Panchana Sotomayor General Hospital.

Materials and methods

Study design

The present study is observational. The source is retrospective.

Stage

This study focused on the neonatology service of the Liborio Panchana Sotomayor General Hospital, which is located in the province of Santa Elena (Ecuador), from January 1, 2017, to January 31, 2020.

Participants

Records of newborn patients in whom there was evidence of drug use by the mother were included.

Variables

The variables included were newborn age, sex, urban or rural origin, neurological symptoms, time of symptom onset, mother's quartile of use, drug type, mother's age, birth weight, height, and gestational age.

Data sources/measurements

The source was indirect; an electronic form was filled out from the data of the institutional medical history. For the investigation of the cases, multiple searches were carried out for pregnant patients with the following ICD-10 diagnoses and derived diagnoses:

F10-F19 Mental and behavioral disorders due to the use of psychoactive substances.

F11 Opioid-related disorders.

F12 cannabis abuse.

F13 Sedative, hypnotic, or anxiolytic-related disorders.

F14 Cocaine-related disorders.

F16 Hallucinogen-related disorders.

F18 Inhalant-related disorders.

F19 disorders related to other psychoactive substances.

Biases

Observation and selection bias were minimized through the application of participant selection criteria. To prevent potential interviewer, information, and memory biases, the principal investigator consistently managed the data with a guide and records approved by the research protocol. Two researchers independently analyzed each record twice, and the variables were entered into the database once their agreement was confirmed.

Study size

The sample was nonprobabilistic, and all incident cases of the period were included.

Quantitative variables

Descriptive statistics were used. The results are presented as frequencies and percentages. Scale variables were not converted into categories variables.

Statistical analysis

The qualitative variables were analyzed with frequencies and percentages. The proportions are compared with the chi-square test. The statistical package used was IBM Corp. (released from 2018). IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.

Results

Participants

Data were collected from a total of 34 neonates who met the previously stated criteria.

Characteristics of the study group

Among the 34 neonates, 64.71% were male. The gestational age of the neonates studied was categorized into two groups, equating the term neonates to 70.6% of the sample. Regarding the place of origin, 73.5% of the patients came from urban areas ([Table 1](#)). The average age of the newborns was 1.35 3.5 days, the birth weight was 2454 586 grams, the birth size was 45.1 3.9 cm, and the maternal age was 20.2 4.7 years.

Onset and type of maternal consumption

A total of 29 patients (85.3%) used drugs during the entire pregnancy, 4 patients (11.8%) used drugs only in the first trimester, and 1 patient (2.9%) used drugs in the second trimester of pregnancy. Among the substances consumed by the mothers, the opioid derivative "H" (a mixture of heroin, diazepam, and fentanyl in variable proportions) was consumed by 91.2% of the mothers of neonates with withdrawal syndrome.

In contrast, marijuana, cocaine, and the combination of these two were consumed by only 2.9% of the mothers.

Table 1. Clinical characteristics of the study group.

	Frequency	Percentage
Gender		
Man	22	64.7%
Woman	12	35.3%
Gestational age		
Preterm	10	29.4%
Term	24	70.6%
Provenance		
Urban	25	73.5%
Rural	9	26.5%

Neurological symptoms

In terms of the neurological symptoms that the neonates presented, acute crying represented 29.41% of the cases, followed by the patients who presented all the symptoms described in 11.8% of the cases; a combination of tremors, high-pitched crying and hypertonia in 11.8% of the cases; a combination of high-pitched crying and hypertonia in 8.8% of the neonates; and a combination of tremors or lethargy with high-pitched crying in 5.9% of the cases. There were isolated cases, equivalent to 2.94%, in which there was a combination of two or more neurological symptoms present in the neonates evaluated ([Figure 1](#)).

There was no significant relationship between the type of substance consumed and the presence of neurological symptoms. Among the 31 children whose mothers consumed H, 8 presented acute crying as the only neurological symptom, followed by 4 who presented all the symptoms, and the remaining children were distributed among the combinations of two or more neurological symptoms ($P = 1.0$).

Discussion

In this study, the characteristics of neonates with neonatal withdrawal syndrome and their mothers were detailed. The most prevalent sex of the neonates with neonatal abstinence syndrome was male, accounting for 64.71% of the sample. In a study by Silva et al. [6] at the Hospital del Niño Dr. Francisco de Icaza Bustamante, male neonates were also more prevalent, accounting for 73.6% of a total of 91 patients. About the gestational age of the neonates, this same study revealed that 84.6% of the neonates were at term, whereas the remaining 14.3% were preterm. This finding is consistent with what was reported in our study, where term infants (between 37 and 41 weeks' gestation) were the most prevalent (70.6%).

Regarding the anthropometric variables of the neonates with withdrawal syndrome studied, the mean weight at birth of the 34 neonates was 2453.68 g, and the mean height was 45.06 cm. These data are comparable to those reported in the study by Gutiérrez et al. [7] carried out in Mexico with a sample of 92 neonates, where the mean birth weight was 2600 g \pm 200 g and the mean height at birth was 47 \pm 3 cm. In our study, the age of the neonates was determined in days, with an average of 1.35 days and a more frequent age of 0 days. This is a unique finding since, in other similar studies, the age of the neonates was not evaluated.

When we analyzed the profile of the mothers of neonates with neonatal abstinence, we found that their mean age was 20.21 years. Despite having a different methodology, when categorizing the ages, the study by Silva et al. [6] revealed that mothers between 20 and 30 years of age were the most prevalent (63.7%), followed by mothers under 20 years of age (33%) and mothers over 30 years of age (3.3%). These data contrast with each other since, in our study, mothers aged 15-19 represented 52.9% of the entire sample. The origin of the population can explain this difference, which has been studied since the study by Silva et al. [6] was carried out in Guayaquil. In contrast, the present study included patients from Santa Elena.

Similarly, the toxicological profile of the mothers of neonates who participated in our study was assessed, and it was determined that the illicit substance most commonly used by mothers was "H", accounting for 91.2% of the total. Moreta and Soria [8] conducted a study at the Mariana de Jesús maternity hospital in Guayaquil from 2015 to 2017 and reported that the illicit substance most commonly used by 102 pregnant women whose products were diagnosed with neonatal withdrawal syndrome was 'H', which was consumed by 51.95%, followed by cannabis, which was consumed by 25.49%, and cocaine, which was consumed by 14.71%. However, this lower proportion is consistent with the number of patients evaluated due to the population density between the two locations studied and the impact of the COVID-19 pandemic in 2020. To determine the toxicological profile of mothers, the most prevalent time of initiation of consumption was determined, which indicated that 85.3% of them consumed the substance during their entire pregnancy, 11.8% consumed it during the first trimester, and only 2.9%

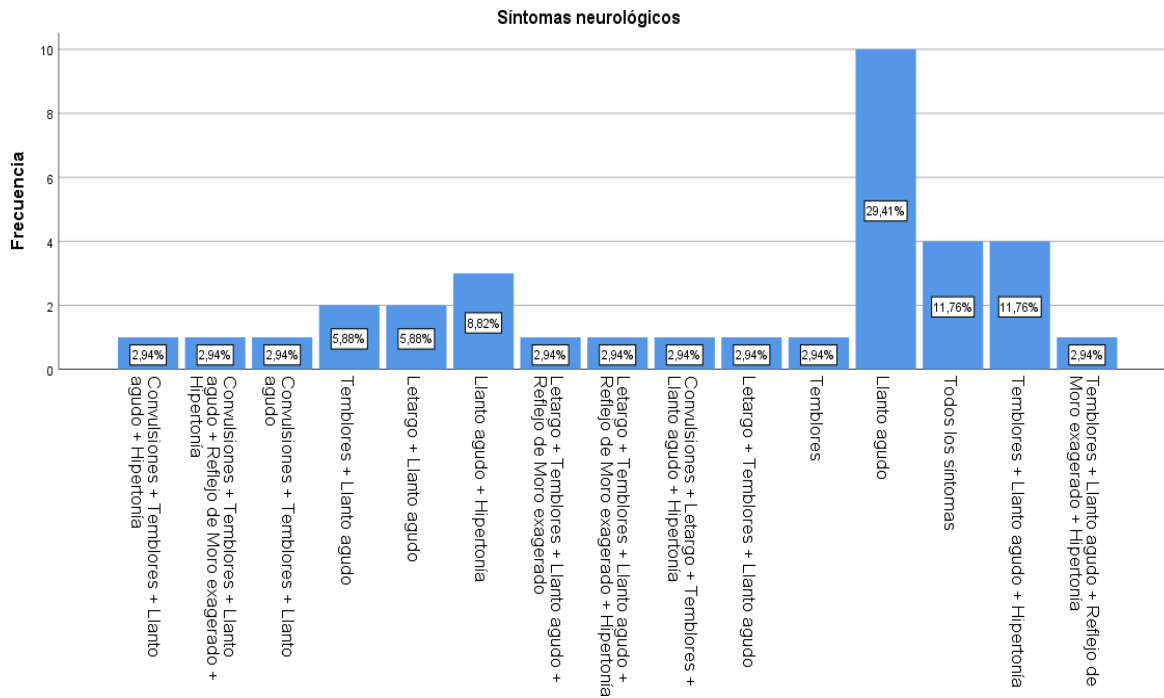
consumed it during the second trimester. A study carried out in Colombia between December 2014 and June 2015 by Pava [9], where the consumption of various drugs of abuse was evaluated in mothers with neonates with withdrawal syndrome, revealed that of the mothers who consumed opioid derivatives, seven, representing 43.8%, did so in the first trimester of pregnancy, five (33.33%) consumed them in the second trimester and three (22.8%) in the third trimester of pregnancy.

With respect to the neurological symptoms present in neonates with neonatal withdrawal syndrome, the most prevalent symptom was acute crying, which was present in isolation in 29.41% of the cases and in combination with other clinical manifestations in 67.4% of the cases. neonates. The aforementioned symptoms occurred in 79.4% of the neonates immediately after birth. Bravo and Parrales [4] reported that the most prevalent clinical manifestation in a group of 42 neonates was excessive sucking, which was found in 81% of cases. In contrast, excessive crying was found in 69% of neonates. The disparity between the values found in this study and ours is dependent on the methodology for tabulating symptoms.

Finally, cross-tables related to neurological manifestations with respect to the type of substance consumed were constructed. In the present study, no statistically significant correlation was found between these variables ($P = 1.0$). This is because the greater distribution within a single group of substances of consumption was the "H".

Among the strengths of the study, a little-studied topic was evaluated within the country and Latin America in general. However, the consumption of illicit drugs is a very evident social problem in these places. Similarly, very few studies have evaluated correlations between the clinical manifestations of withdrawal syndrome in neonates and other study variables presented in the present study.

The weaknesses of the study are related to the small sample size, which led to insignificant results in the correlations section. However, this limitation is related to the low influx of patients who usually came to this nursing home in 2020 as a result of the COVID-19 pandemic and the prioritization of care for respiratory patients. In addition, most pregnant women with problematic drug use may have been transferred to more complex health units for better treatment.

Figure 1 . Neurological symptoms in neonates with withdrawal syndrome.

Conclusions

The most prevalent neurological symptom in neonates with withdrawal syndrome is high-pitched crying, which most frequently begins immediately after delivery. Similarly, it was determined that male sex was the most prevalent sex among the neonates studied and that most of them were full-term neonates. Together, we conclude that most of the mothers in our study were adolescent mothers and that the most commonly used drug was "H", which was most commonly consumed throughout pregnancy. No statistically significant correlation was found between the type of substance used by the mother and the development of various kinds of neurological symptoms.

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Declarations

Ethics committee approval and consent to participate

The bioethics committee of the Faculty of Medical Sciences of the Catholic University of Santiago de Guayaquil approved the study.

Publication consent

This information was not needed because the present study did not publish images, radiographs, or specific studies of patients.

Conflicts of interest

This research has no financial interests or conflicts of interest.

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