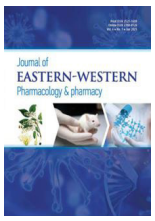

Original Article
https://doi.org/10.64269/jewpp.v6i2.4782

Journal of
EASTERN-WESTERN
Pharmacology & pharmacy

A STATISTICAL STUDY ON DRUG POISONING AND CHEMICAL POISONING CASES AT THE NATIONAL CENTER FOR MATERNAL AND CHILD HEALTH (2020–2024).

Mungunbolor Chinbat[1], Lkhagvasuren Tsolmon[2], Khandmaa Byambatsogt[3], Batsolongo Rentsindorj[3], Enkhtaiwan Batkhuu[4], Batkhuyag Purewjav[2]*

[1] *Pharmacy student of Mongolian University of Pharmaceutical Sciences, Ulaanbaatar, Mongolia*
[2] *Department of Pharmacology and Clinical Pharmacy, Mongolian University of Pharmaceutical Sciences, Ulaanbaatar, Mongolia*
[3] *National Center for Maternal and Child Health, Ulaanbaatar, Mongolia*
[4] *National Center for Maternal and Child Health, Ulaanbaatar, Mongolia*

KEYWORDS

Drug poisoning, chemical poisoning, medical history, causes of poisoning, child health

Received: 2025/06/08 Accepted: 2025/10/13
Revised: 2025/09/15 Published: 2025/11/20

ABSTRACT

With the advancement of modern science, technology, and biological development, the use of medications has increased, and in some cases, due to uncontrolled usage by parents, children are often exposed to drug poisoning. This poses serious health and life-threatening risks to children, depending on their age, body characteristics, and the type of medication used, as evidenced by international studies. The analysis of the medical history of children poisoned by drugs and chemicals aims to identify the causes of poisoning, the medications and chemicals involved, treatment costs, and preventive measures. Methods: The study will be conducted as a retrospective observation study based on the medical record inpatients in the Internal Medicine Department of National Center for Maternal and Child Health. A sampling approach will be used, nd the data will be analyzed using both extensive indicators and clarification techniques.; Results: The results of the study showed that the majority of poisoning cases involving by drugs and chemicals were accidental (73.24%). Analysis of age distribution of the children affected by poisoning, the highest number of cases were found in young children and preschool-aged children (61.04%). Among adolescents, there was a tendency for self-harm (16.74%) and drug/chemical use for recreational purposes (1.65%). The most common form of poisoning was due to medications, with carbamazepine, iron preparations, and nafazoline being the most frequently involved drugs; Conclusions: The study confirms that young children are most frequently affected by acute poisoning from drugs and chemicals. Accordingly, there is a need to enhance oversight and create conditions for the safe storage of chemicals and pharmaceutical substances. Additionally, providing psychological support services for adolescents, developing content and educational programs to positive behaviors, which may help reduce the risk of self-harm and substance abuse.

**Department of Pharmacology and Clinical Pharmacy, Mongolian University of Pharmaceutical Sciences, Ulaanbaatar, Mongolia, E-mail: batukhuyag@yahoo.com*

INTRODUCTION

In today's era of rapid scientific, technological, and biological advancements, new medications and treatments are widely used in the management of childhood illnesses. However, sometimes parents administer these without proper medical supervision, leading to accidental overdoses and poisoning when medications are left within reach of children. The impact of drug poisoning in children depends on factors such as the type of drug, its quantity, the child's age and gender, and how the drug enters the body. Younger children are particularly vulnerable and often experience more severe poisoning. These poisoning cases are not only harmful to children's health but also represent pose significant public health concern. Unfortunately, such research has been limited in Mongolia, which is why this topic has been chosen for further study. This study performed a retrospective analysis of the clinical data from 832 hospitalized National Center for Maternal and Child Health from January 1, 2020, to December 31, 2024.

MATERIALS AND METHODS

Data collection

All cases in this study were collected from hospitalized National Center for Maternal and Child Health (NCMCH) from January 1, 2020, to December 31, 2024.

Methods

The study will be conducted using a statistical observation method based on the medical histories of inpatients in the Internal Medicine Department of NCMCH. A sampling survey method was employed, and the data were analyzed using both extensive indicators and clarification techniques.

Inclusion criteria

- Age**:** 0–18 years
- Diagnosis**:** Drug and chemical poisoning (T36–T50, T51–T65)
- Hospitalization**:** Must have been admitted for inpatient treatment
- Medical Records: Complete medical history with all required parameters documented

Grouping method

According to the growth and development stage of children in pediatrics, it is divided into neonatal and infant periods (0–1 year), early childhood (1–3 years), preschool periods (3–7 years), school age and adolescence (≥7 years).

Statistical analysis

SPSS 25.0 statistical software was used to process the data. The distribution of general count data, such as age, sex, and toxicant species, was described by the number of cases and composition ratio (%). The x2 test or statistical inference was used to compare the categorical variable components, and the test was used to compare the count variable groups. $P<0.05$ was considered statistically

RESULTS

The results of the study on the age distribution, gender prevalence, and the medical history related to poisoning among the 126 children involved in the study in 2020 are as follows.

Table 1. Descriptive Statistics

	Total	Minimum age	Maximum age	Mean age	Std. Deviation
Age	126	1	17	5.88	5.359
Valid total (listwise)	126				

Among the 126 children admitted in 2020 and included in the study, the youngest was 1 year old and the oldest was 17. The mean age was 5.88 years, with a standard deviation of 5.359. The age range was wide, with most participants being relatively young. The data show a varied distribution, with a notable gap between the youngest and oldest, reflecting a broad age spectrum in the study population.

Table 2.Gender Distribution

Gender			
		Frequency	Percentage
Valid	Female	67	53.2
	Male	59	46.8
	Total	126	100.0

The 126 children involved in the study included 53.2% females, representing 67 children, and 46.8% males, representing 59 children. From this, it can be observed that the number of male and female children was balanced, with a difference of 6.4% between them.

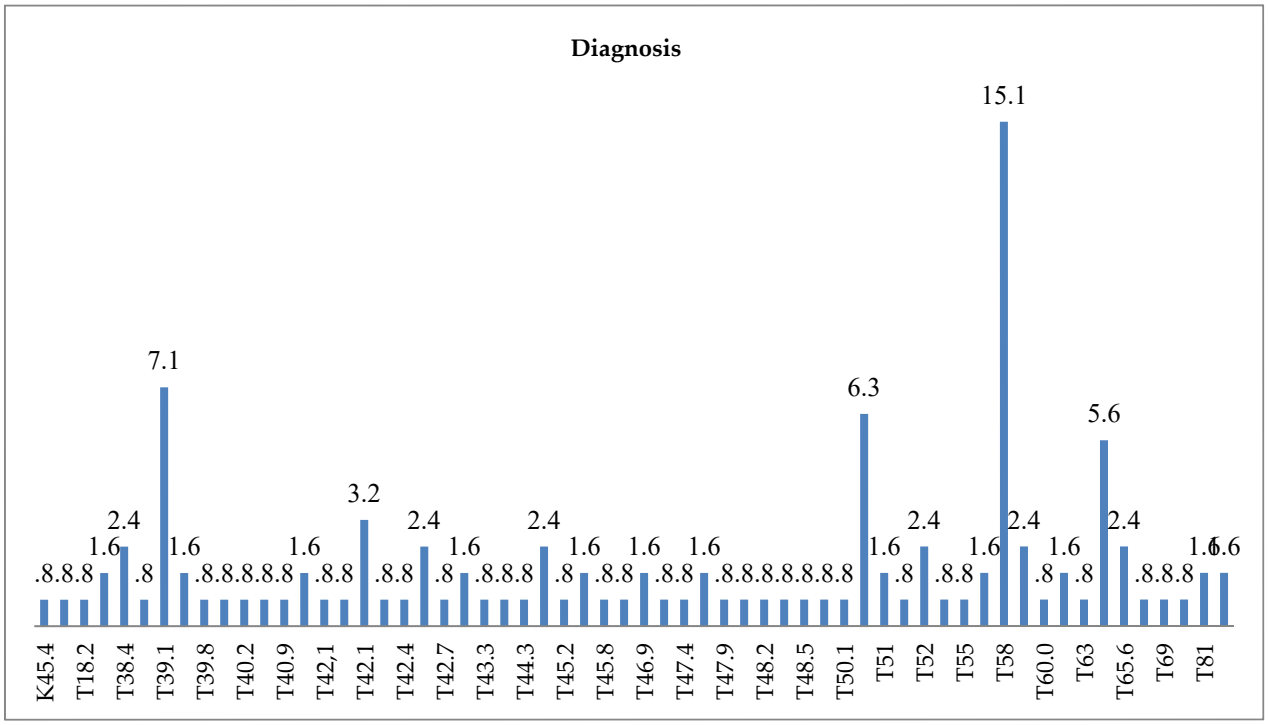

Figure 1. Diagnosis

Among the substances and types of medications, carbon monoxide poisoning was the most common, accounting for 15.1% of the total cases. This was followed by carbamazepine (7.1%) indicating that these were the primary contributors to poisoning incidents.

Table 3.Correlation Analysis

Title 1	cause	age	education
Cause	1	-.077	.985**
		.390	.000
		126	126
Age		1	-.078
			.386
			126
Education			1

Correlation is significant at the 0.01 level (2-tailed).

The education level shows a positive and strong correlation with the cause of the illness (R = 0.985** and P = 0.000). This suggests that parental education could influence the cause of the disease.

The results of the study on the age distribution, gender prevalence, and the medical history related to poisoning among the 129 children involved in the study in 2021 are as follows.

Table 4. Demographic and Clinical Characteristics of Pediatric Poisoning Cases (2021)

		mean	Percentage
Age	0-3	78	61.9
	4-7	15	11.9
	8-11	5	3.97
	12-18	28	22.23
Gender	male	60	46.5
	female	69	53.5
Length of hospital stay	1-3	78	60,4
	4-7	36	27.9
	8-15	15	11,6
Diagnosis	T36-50	93	72,09
	T51-65	36	27.9

Summarizes the demographic and clinical characteristics of the 129 pediatric patients included in the **2021** dataset. The majority of children (61.9%) were between 0–3 years of age, followed by 22.23% in the 12–18 age group. In terms of gender, 53.5% were female and 46.5% were male, indicating a slightly higher proportion of female cases. Regarding the length of hospital stay, most patients (60.4%) were hospitalized for 1–3 days, 27.9% stayed for 4–7 days, and 11.6% required 8–15 days of hospitalization. For diagnosis, 72.09% of the cases were classified under ICD-10 codes T36–T50, which include drug poisoning, while 27.9% fell under codes T51–T65, indicating chemical poisoning.

Correlation Analysis

Diagnosis and cause showed a correlation of R = 0.829** with a p-value of 0.000, indicating a statistically significant and positive relationship between the two variables.

The results of the study on the age distribution, gender prevalence, and the medical history related to poisoning among the 132 children involved in the study in 2022 are as follows.

Table 5. Demographic and Clinical Characteristics of Pediatric Poisoning Cases (2022)

		mean	Percentage
Age	0-3	68	51.51
	4-7	14	10.6
	8-11	8	6.06
	12-18	42	31.8
Gender	male	51	38.6
	female	81	61.36
Length of hospital stay	1-3	76	57.6
	4-7	43	32.6
	8-17	13	9.8
Diagnosis	T36-50	81	61.4
	T51-65	51	38.6

This table summarizes the demographic and clinical characteristics of the pediatric poisoning cases. The largest age group was 0–3 years (51.51%), followed by 12–18 years (31.8%). Females accounted for 61.36% of cases, while males made up 38.6%. Most children (57.6%) were hospitalized for 1–3 days. In terms of diagnosis, 61.4% were drug poisoning cases (T36–T50), and 38.6% were chemical poisoning cases (T51–T65).

Table 5. Distribution of Poisoning Causes Among Pediatric Patients (n = 132).

		mean	Percentage
Cause	Suicidal attempt	26	19.7
	Mistaken intake	5	3.8
	Dispensing error by pharmacist	2	1.5
	Intentional poisoning by others	2	1.5
	Substance abuse	3	2.3
	Unintentional poisoning	88	66.7
	Overdose	5	3.8
	Total	132	100.0

Among the 132 cases, unintentional poisoning was most common (66.7%), followed by suicidal attempts (19.7%). Other causes included overdose (3.8%), mistaken intake (3.8%), substance abuse (2.3%), and both dispensing errors and intentional poisoning by others (1.5% each).

The results of the study on the age distribution, gender prevalence, and the medical history related to poisoning among the 183 children involved in the study in 2023 are as follows.

Table 6. Demographic and Clinical Characteristics of Pediatric Poisoning Cases (2023)

		mean	Percentage
Age	0-3	73	39:9
	4-7	21	11.5
	8-11	28	15.3
	12-18	61	33.3
Gender	male	85	46.4
	female	98	53.6

Length of hospital stay	1-3	107	58.4
	4-7	67	36.6
	8-17	9	4.9
Diagnosis	T36-50	99	54.9
	T51-65	84	45.9

The table shows that among the 183 pediatric patients, 39.9% were aged 0-3 years, and 33.3% were aged 12-18 years. Females made up 53.6% of the cases, while males accounted for 46.4%. Most children (58.4%) were hospitalized for 1-3 days. In terms of diagnosis, 54.9% had drug poisoning (T36-50), and 45.9% had chemical poisoning (T51-65).

Table 7. Distribution of Poisoning Causes Among Pediatric Patients (n = 183).

		mean	Percentage
Cause	Suicidal attempt	32	17.5
	Substance abuse	6	3.3
	Unintentional poisoning	137	74.8
	Overdose	8	4.4
	Total	183	100.0

The table shows the distribution of poisoning causes among the pediatric patients, with a total of 183 cases. The most common cause of poisoning was unintentional poisoning (74.8%), followed by suicidal attempts (17.5%). Overdose accounted for 4.4% of the cases, while substance abuse contributed to 3.3% of the incidents. This indicates that unintentional poisoning was the leading cause, and cases of intentional poisoning (suicidal attempts and substance abuse) were relatively less frequent.

The results of the study on the age distribution, gender prevalence, and the medical history related to poisoning among the 262 children involved in the study in 2024 are as follows.

Table 8. Demographic and Clinical Characteristics of Pediatric Poisoning Cases (2024)

		mean	Percentage
Age	0-3	110	41.9
	4-7	47	17.9
	8-11	18	6.9
	12-18	87	33.3
Gender	male	125	47.9
	female	136	52.1
Length of hospital stay	1-3	186	70.9
	4-7	65	24.8
	8-17	11	4.1
Diagnosis	T36-50	170	64.8
	T51-65	92	35.1

This table outlines the demographics and clinical details of pediatric poisoning cases. The largest age group was 0-3 years (41.9%), followed by 12-18 years (33.3%). Females made up 52.1% of the cases, while males accounted for 47.9%. Most children (70.9%) were hospitalized for 1-3 days. Regarding diagnosis, 64.8% had drug poisoning (T36-50), and 35.1% had chemical poisoning (T51-65).

Table 9. Distribution of Poisoning Causes Among Pediatric Patients (n = 262).

		mean	Percentage
Cause	suicidal attempt	55	21.0
	Substance abuse	3	1.1
	Unintentional poisoning	186	70.9
	Overdose	18	6.9
	Total	262	100.0

This table summarizes the causes of poisoning among 262 pediatric patients. The most frequent cause was unintentional poisoning, accounting for 70.9% of the cases. Suicidal attempts were the second most common, making up 21.0%. Overdose represented 6.9%, while substance abuse was the least common,

at 1.1%. This indicates that most poisonings occurred accidentally, but a significant portion also involved intentional self-harm.

DISCUSSION

Between 2020 and 2024, a study over 830 pediatric poisoning cases yielded the following key findings:

The highest poisoning rates were observed in children aged 0–3 years. Annually accounted for 40–60% of cases, indicating that accidental poisoning is common due to lack of supervision and easy access to hazardous substances at home. Meanwhile, poisoning cases among adolescents (aged 12–18) have shown a yearly increase, likely associated to intentional actions and mental health issues.

Female children consistently consistently represented for a slightly higher proportion of poisoning cases than males, ranging between 52–61% annually. Although the gender difference was small, girls were slightly more affected ~~overall.~~

The most common cause was accidental poisoning, representing about 70% of all cases. This is often due to poor supervision and unsafe storage of medications and chemicals at home. Among adolescents, suicide attempts increased since 2022, representing about 20% of cases, which highlights the need for psychological support. Other causes such as overdose and substance abuse, though less frequent, remain concerns requiring attention.

Most poisoning cases involved drug ingestion, resulting improper storage, children's access to medications, or intentional consumption. Although chemical poisoning occurred less frequently, it remains a significant issue.

The majority of children were hospitalized for 1–3 days, suggesting that many cases were mild. However, a considerable number required 4 or more days of treatment, reflecting more severe cases.

The study found a strong correlation between the parents' level of education and the cause of poisoning (R = 0.985), suggesting that parental knowledge, awareness, and behavior play a crucial role in preventing childhood poisoning.

The findings indicate that accidental poisoning among young children is highly prevalent, underscoring the need to improve safety at home. The rising incidence of intentional poisoning among adolescents highlights the growing importance of mental health support. Educating and informing parents and caregivers is essential, as their awareness significantly impacts the likelihood of poisoning incidents. Preventative measures, public education, and access to psychological services are essential for reducing both the incidence and the severity of pediatric poisoning.

CONCLUSION

From 2020 to 2024, analysis of 830 pediatric poisoning cases revealed that children aged 0–3 years accounted for 40–60% of incidents annually, reflecting their heightened vulnerability under inadequate supervision and ease of exposure in home settings. Poisoning incidents in adolescents (12–18 years) increased over time, often associated with intentional behavior and mental health concerns. Accidental poisonings predominated (~70%), predominantly attributed to unsafe storage and easy access to drugs and chemicals. Since 2022, suicide attempts among adolescents constituted approximately 20% of poisoning cases, emphasizing the urgency of psychological support. The majority of cases involved ingestion of medications; though less frequent, chemical poisonings remained a notable concern. While hospitalization typically lasted 1–3 days, a significant proportion required longer durations, indicating more severe cases. A strong positive correlation (R = 0.985) was observed between parental education levels and poisoning etiologies, underscoring the critical role of caregiver awareness. These findings advocate for a multifaceted prevention strategy: enhancing household safety, enforcing stringent storage protocols, expanding mental health services, and instituting caregiver education to mitigate both the frequency and severity of pediatric poisoning.

References

1. S M. Acute drug poisoning. In: Drug poisoning in children and emergency care. Ulaanbaatar: Ulaanbaatar State Publishing House; 1981. p.40.
2. Batkhuya P. Acute drug poisoning: A case of pediatric poisoning. 2002.
3. Center for Health Development (CHD). Foreword. Ulaanbaatar: Ministry of Health; 2023 [cited 2025 May 9]. Available from: https://hdc.gov.mn/media/files/2023%20uzuulelt.pdf
4. World Health Organization. Poison control and unintentional poisoning [Internet]. 2023 [cited 2025 May 9]. Available from: https://www.who.int/data/gho/data/themes/topics/indicator-groups/poison-control-and-unintentional-poisoning
5. Chisholm-Burns MA, Schwinghammer TL, Malone PM, Kolesar JM, Lee KC, Bookstaver PB. Pharmacotherapy. New York: McGraw Hill Education; 2019. p.547–561.
6. O Sudalgaa. Study on poisoning among children in Malaysia [Internet]. 2022 Apr 28 [cited 2025 May 9]. Available from: https://pubmed.ncbi.nlm.nih.gov/35482773/

7. Analysis of notified drug poisoning among children in Santa Catarina state, 2016–2020 [Internet]. ResearchGate;[cited 2025 May 9]. Available from: https://www.researchgate.net/publication/372272041_Analysis_of_notified_drug_poisoning_among_children_in_Santa_Catarina_state_2016-2020
8. Maior Md. Hospitalizations due to drug poisoning in under-five-year-old children in Brazil, 2003–2012 [Internet]. 2017 Dec 26 [cited 2025 May 9]. Available from: https://pubmed.ncbi.nlm.nih.gov/29211141/
9. Batkhuyag P. Essential Medicines Reference of Mongolia. 2010. p.34–39.
10. Orgil B. Clinical pharmacology and pharmacotherapy. Ulaanbaatar: Soyombo Printing Publishing House; 2022. p.99–118.
11. Batkhuya P. Fundamentals of Clinical Pharmacology. Ulaanbaatar: Ikh Uul Trade Publishing House; 2000. p.56–60.
12. McKay GA, Walters MR. Clinical Pharmacology and Therapeutics. Oxford: John Wiley& Sons Ltd; 2023. p.269.
13. Guidelines for diagnosis and treatment of common diseases and conditions. Ulaanbaatar: Bayanmongol Capital Publishing House; 2020. p.731–775.
14. Hu QY, Ding ZZ, Zhao B, Fu LG, Xu H. Clinical analysis of 427 cases of acute poisoningin children in Bengbu area. Chin J Gen Pract. 2021;19(3):432–5. doi:10.16766/j.cnki.issn.1674-4152.001829.
15. Bundotich JK, Gichuhi MM. Acute poisoning in the Rift Valley Provincial General Hospital, Nakuru, Kenya: January to June 2012. S Afr Fam Pract. 2015;57:214–8. doi:10.1080/20786190.2014.975448.
16. Wang CW, Chan CL, Yip PS. Suicide rates in China from 2002 to 2011: an update. Soc Psychiatry Psychiatr Epidemiol. 2014;49:929–41. doi:10.1007/s00127-013-0789-5.
17. Thomas M, Anandan S, Kuruvilla PJ, et al. Profile of hospital admissions following acute poisoning – experiences from a major teaching hospital in South India. Adverse Drug React Toxicol Rev. 2000;19:313–7.
18. Tüfekçi IB, Curgunlu A, Sirin F. Characteristics of acute adult poisoning cases admitted to a university hospital in Istanbul. Hum Exp Toxicol. 2004;23:347–51. doi:10.1191/0960327104ht460oa.
19. Jeyaratnam J. Acute pesticide poisoning: a major global health problem. World Health Stat Q. 1990;43:139–44.
20. Jaiprakash H, Sarala N, Venkatarathnamma PN, et al. Analysis of different types of poisoning in a tertiary care hospital in rural South India. Food Chem Toxicol. 2011;49:248–50. doi:10.1016/j.fct.2010.10.026.
21. van der Hoek W. Analysis of 8000 hospital admissions for acute poisoning in a rural area of Sri Lanka. Clin Toxicol. 2006;44:225. doi:10.1080/15563650600584246.
22. Howlader MAR, Hossain MZ, Morshed MG, et al. Changing trends of poisoning in Bangladesh. J Dhaka Med Coll. 2011;20:51–6. doi:10.3329/jdmc.v20i1.8582.