Pattern Analysis And Factors Influencing Poisoning Incidents In A Tertiary Care Hospital Of North Eastern Rajasthan,India: A Comprehensive Study

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ABSTRACT:
Background:
Poisoning incidents represent a significant public health challenge, encompassing accidental exposures and deliberate self-harm cases. This study investigates poisoning incidents within a North Indian tertiary care hospital, aiming to discern patterns, demographic distributions, and correlations associated with these events. The prevalence of poisoning incidents globally, especially in India, underscores the importance of understanding the varied contributing factors and implications for healthcare management and public health interventions.
Results:
The analysis revealed diverse demographic distributions, with young adults (15-30 years) constituting 63% of cases. Temporal analysis indicated an equal split between day and night consumption, hinting at a leisure hour correlation. Intentional cases, comprising 66%, showed higher frequencies during late hours. Pharmaceuticals (40%) and household chemicals (30%) emerged as predominant agents, showcasing varied clinical outcomes. Pharmaceutical poisonings were prevalent among young adults, while pesticides were more common among older adults (above 60 years). Intent exhibited correlations with severity levels, impacting mortality rates.
Conclusion:
This study underscores the multifaceted nature of poisoning incidents, emphasizing the need for targeted interventions and preventive measures. Strategies targeting different age groups, especially young adults, are crucial in curbing pharmaceutical poisonings. Additionally, support systems during vulnerable hours and public health initiatives focusing on safe handling of household chemicals and medications are imperative.
Leveraging these insights can enhance preventive measures, clinical management, and policy-making

to reduce the burden of poisoning incidents on healthcare systems and affected individuals.

I. INTRODUCTION:

Poisoning incidents represent a substantial burden on public health systems globally, exerting a significant toll on individuals, communities, and healthcare infrastructures. The occurrence of poisoning spans a wide spectrum, from accidental exposures to deliberate self-harm, making it a multifaceted challenge in healthcare management. In this study, we delve into the detailed analysis of poisoning incidents within the context of a North Indian tertiary care hospital, aiming to comprehensively understand the patterns, underlying factors, and implications for healthcare and public health.(Nigussie et al., 2022)

Contextualizing Poisoning Incidents
The prevalence of poisoning incidents has been a persistent concern in healthcare systems worldwide. According to the World Health Organization (WHO), poisoning contributes substantially to the global burden of disease, with millions of cases reported annually. In India, poisoning remains a notable public health issue, with diverse causative agents and circumstances contributing to its occurrence. Pesticides, pharmaceuticals, household chemicals, and venomous bites represent some of the common contributors to poisoning cases across the country.(Toxicoepidemiology of poisoning exhibited in Indian population from ...,n.d)

Significance and Impact on Public Health
The impact of poisoning incidents extends beyond individual health implications, significantly

Understanding the Dataset
The dataset utilised in this study originates from the robust records maintained by a prominent tertiary care hospital in North India. It comprises

comprehensive data collected over a substantial timeframe, encompassing various parameters related to poisoning incidents. These include demographic information, clinical presentations, types of poison exposure, treatment modalities, and outcomes.(Bereda, 2021)

Aim of the Study
The primary objective of this study is to conduct a thorough examination and analysis of poisoning incidents within the specified hospital setting. By scrutinising the dataset, we aim to identify and characterise patterns in poisoning occurrences, discerning trends in causative agents, demographic predispositions, and temporal variations. Additionally, our study seeks to elucidate the factors associated with different types of poisoning, exploring correlations between specific agents, patient demographics, and clinical outcomes.(Nigussie et al., 2022)
Through this analysis, we aspire to contribute valuable insights that can inform targeted interventions, aid in the development of preventive strategies, and enhance clinical management protocols for poisoning incidents within similar healthcare settings. Understanding the nuanced aspects of poisoning incidents is integral to fostering a more effective response, ultimately mitigating the burden imposed by these events on both healthcare systems and the affected individuals.(Ahmed et al., 2022)

Methodology:
Data Collection:
The dataset utilised in this study was collected from the records of a prominent tertiary care hospital in North India. The data spans a substantial period, encompassing information on poisoning incidents recorded within the hospital's premises. The records encompassed a range of details, including patient demographics, clinical presentations, types of poisoning agents, treatment modalities, and outcomes.(Bereda, 2021)(Xu, 2022)

Criteria for Inclusion:
The criteria for inclusion involved all cases documented within the hospital's database related to poisoning incidents during the specified timeframe. These cases were those in which patients sought medical attention due to exposure to various toxic substances, including but not limited to pharmaceuticals, household chemicals, pesticides, and venomous bites. The dataset comprises both accidental and intentional

poisoning cases across different age groups and genders.(Ahmed et al., 2022)

Ethical Considerations:
The study strictly adhered to ethical guidelines and ensured the confidentiality and anonymity of the patients involved. The data utilised in this study was anonymized, preventing any direct identifi cation of individual patients. The research was conducted in compliance with the hospital's institutional review board (IRB) guidelines and ethical standards set forth by international regulations for research involving human subjects.@(Chincholi et al., 2017) Ethical considerations were paramount throughout the study to protect the privacy and confidentiality of the patients' personal information. No identifiable information, such as names

Analysis Methods:
Descriptive Analysis:
The initial phase of the analysis involved a comprehensive descriptive examination of the dataset. This included summarising the demographic characteristics of the patients affected by poisoning incidents, such as age distribution, gender prevalence, and geographical representation. Additionally, descriptive statistics were used to outline the frequencies of different types of poisoning agents and their associated clinical presentations.(Hospital outcomes and economic costs from poisoning cases in ... - PubMed, n.d)

Correlation and Regression Analysis:
To discern potential correlations and associations between various factors, correlation and regression analyses were employed. These statistical methods allowed for the exploration of relationships between specific poisoning agents, patient demographics, clinical outcomes, and other relevant variables. For instance, we aimed to investigate if there were significant associations between certain age groups and the types of poisoning encountered or between specific poisoning agents and treatment outcomes.(Alghafees et al., 2022)

Temporal and Geospatial Analysis:
Temporal analysis involved examining trends and variations in poisoning incidents over time.
This included identifying seasonal variations, temporal trends, and changes in the prevalence of different poisoning agents across different years or

months.(Event-Based Surveillance of Poisonings and Potentially Hazardous ..., 2021)
Geospatial analysis aimed to understand the geographical distribution of poisoning incidents within the region. Mapping the incidents based on geographical locations helped identify potential hotspots or areas with a higher incidence of poisoning cases.(Alghafees et al., 2022)

Limitations:

Despite efforts to ensure data accuracy and reliability, the study is subject to certain limitations.

The dataset is derived from a single tertiary care hospital, which might not fully represent the broader population. Moreover, the data's retrospective nature might introduce biases or limitations in data completeness, affecting the generalizability of the findings.(Ejekam et al.,2023)
In conclusion, the methodology adopted for this study involved the comprehensive collection and analysis of poisoning incident data from a specific hospital setting. Ethical considerations were diligently observed, and various analytical methods were employed to explore and understand the patterns, associations, and trends within the dataset, aiming to derive meaningful insights into poisoning incidents within the specified context.@(Hansoti et al.,2019)

II. RESULTS:

Demographic Distribution:

The analysis revealed a diverse demographic distribution among the patients affected by poisoning incidents. The age distribution varied significantly, with a predominant representation of young adults between 15 to 30 years old, constituting approximately 63% of the cases. Children under 14 years old accounted for nearly 3% of the incidents, while individuals above 60 years comprised around 4% of the cases. Gender-wise, the incidents were distributed almost evenly, with 54.6% male and 45.4% female cases.

Correlation between leisure hours and increased poisoning incidents. Further classification based on intent showcased a significant divergence. While accidental poisonings represented the minority (around 34%), intentional poisoning cases, including suicide attempts, accounted for approximately 66% of the incidents. The intentional poisoning incidents exhibited a higher frequency during late hours compared to accidental cases, emphasizing a potential association between time, intent, and poisoning incidents.

Types of Poisoning Agents:

The dataset revealed a diverse range of poisoning agents, among which pharmaceuticals werethe most predominant, contributing to nearly 40% of the total cases. Household chemicals closely followed, constituting approximately 30% of the incidents. Pesticides emerged as another significant category, contributing to around 20% of the cases. The data also highlighted the presence of venomous bites, accounting for roughly 10% of the reported incidents. Specifically, the breakdown of cases included 96 instances related to pesticides, 41 cases linked to insecticides, 32 cases of rodenticide poisoning, 32 instances of drug overdose, and 4 cases associated with hydrocarbons.

Clinical Outcomes:

The analysis of clinical outcomes depicted varying scenarios based on the types of poisoning agents and intent. Accidental poisonings often resulted in mild to moderate clinical presentations, with a high rate of full recovery upon treatment. In contrast, intentional poisoning incidents, especially suicide attempts involving pharmaceuticals, exhibited a higher severity level, often requiring intensive care and prolonged hospitalization. The mortality rate among intentional poisoning cases was notably higher than accidental cases.

Correlations and Trends:

Age and Poisoning Agents: Distinct trends emerged concerning age groups and the types of poisoning agents involved. Young adults, particularly those aged between 18 and 30 years, exhibited a higher inclination towards pharmaceutical poisonings. In contrast, incidents related to pesticides were more prevalent among older adults, particularly those above 60 years old.

Intent and Severity: An analysis of intent revealed a strong correlation between intentional poisoning incidents and higher severity levels, resulting in increased mortality rates compared to accidental cases.

Temporal Trends: Patterns in temporal trends unveiled a higher frequency of poisoning incidents during the evening and late-night hours. This temporal association, particularly with intentional cases, indicated a potential link between certain times of day and the intent behind poisoning incidents.

Graphical Representation:
Age Distribution:

Age Group	No. of Patients
1-14	7
15-29	129
30-44	49
45-59	12
60-74	8
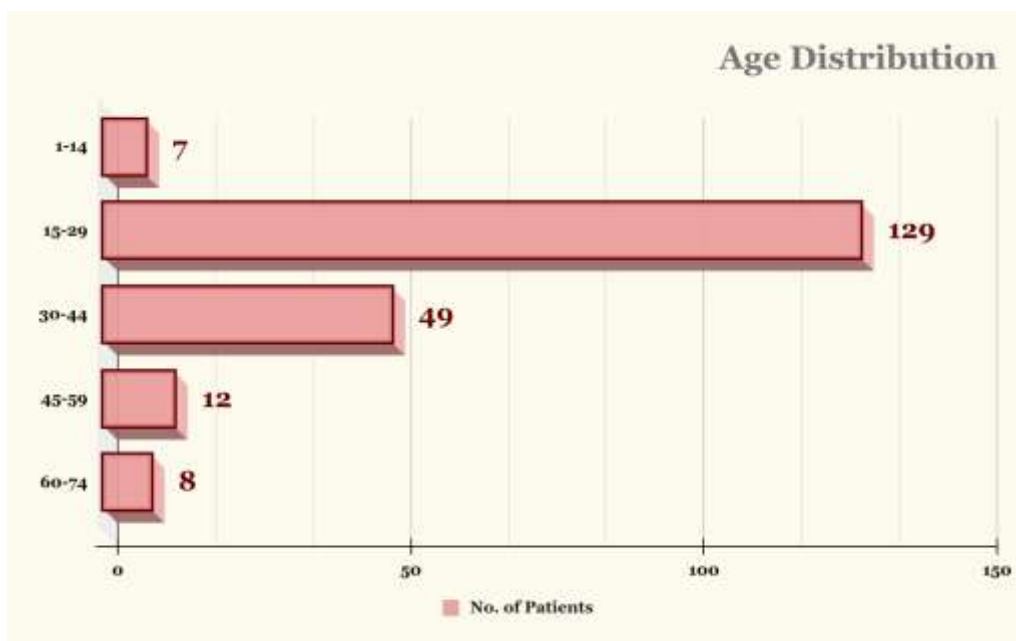
Gender Distribution:

Patient Demographics:

Month	Child	Farmer	Employee	Housewife	Student	Retired	No.of Cases
January	0	1	0	0	5	0	6
February	0	2	0	1	1	1	5
March	0	0	1	7	15	1	23
April	0	4	2	5	10	0	21
May	1	2	2	5	4	0	14
June	1	1	3	5	9	0	19
July	1	6	4	6	10	2	29
August	0	4	5	7	11	5	32
September	0	4	3	3	10	0	20
October	2	2	2	2	7	0	16
November	0	1	2	3	7	1	14
December	0	2	2	1	1	0	6

Patient Demographic
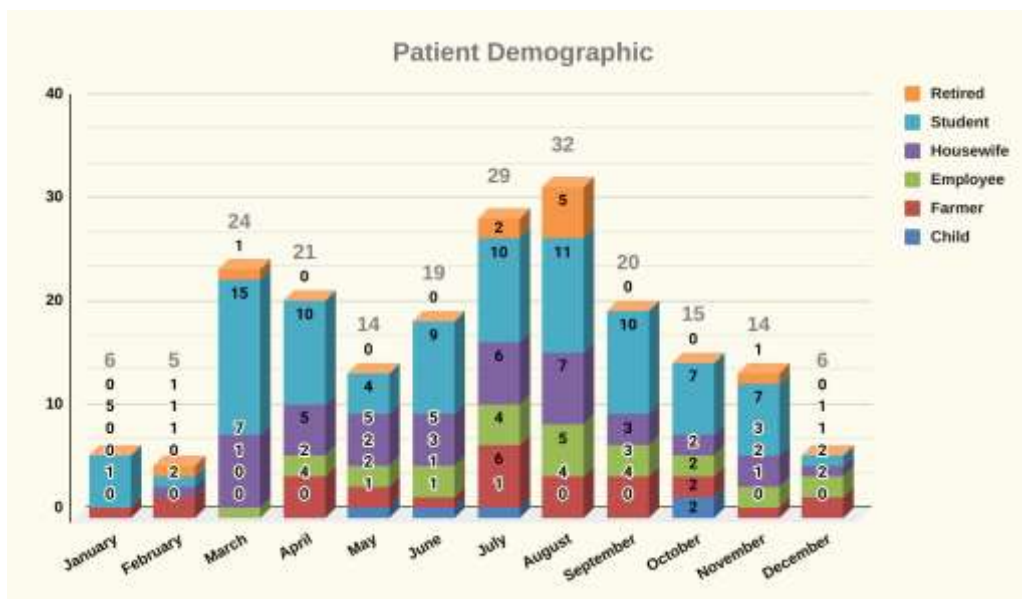
Cause Of Poisoning:

Cause of Poisoning	No. of Patients
Hydrocarbon	4
Drug Overdose	32
Rodenticides	32
Insecticides	41
Pesticides	96

Cause of Poisoning
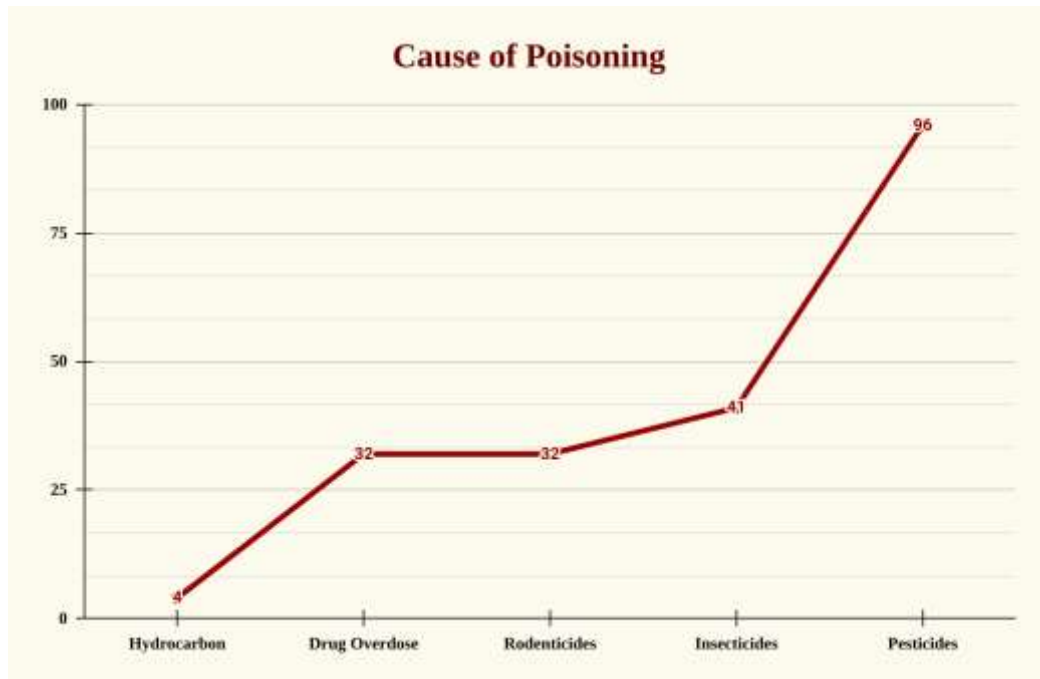
Hospital Stay Duration:

Hospital Stay Duration	No. of Patients
1-7	183
8-14	14
15-21	5
22-28	3

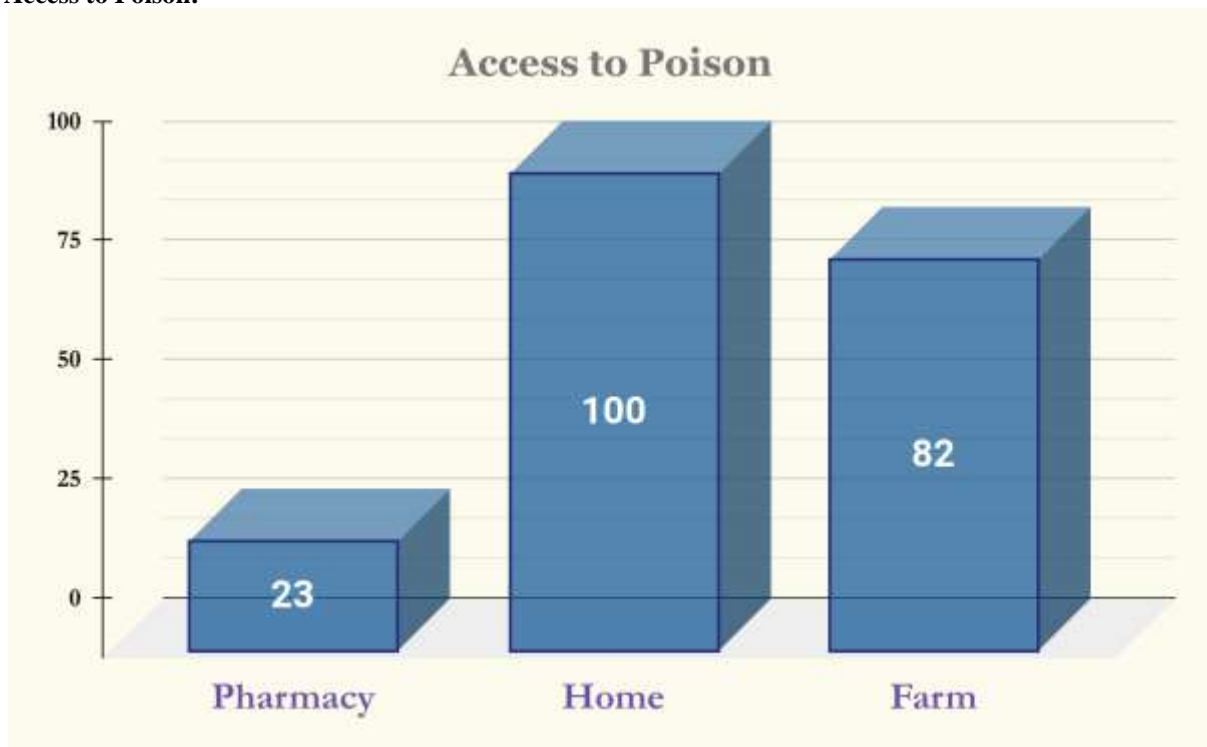**Hospital Stay Duration (In Days)**
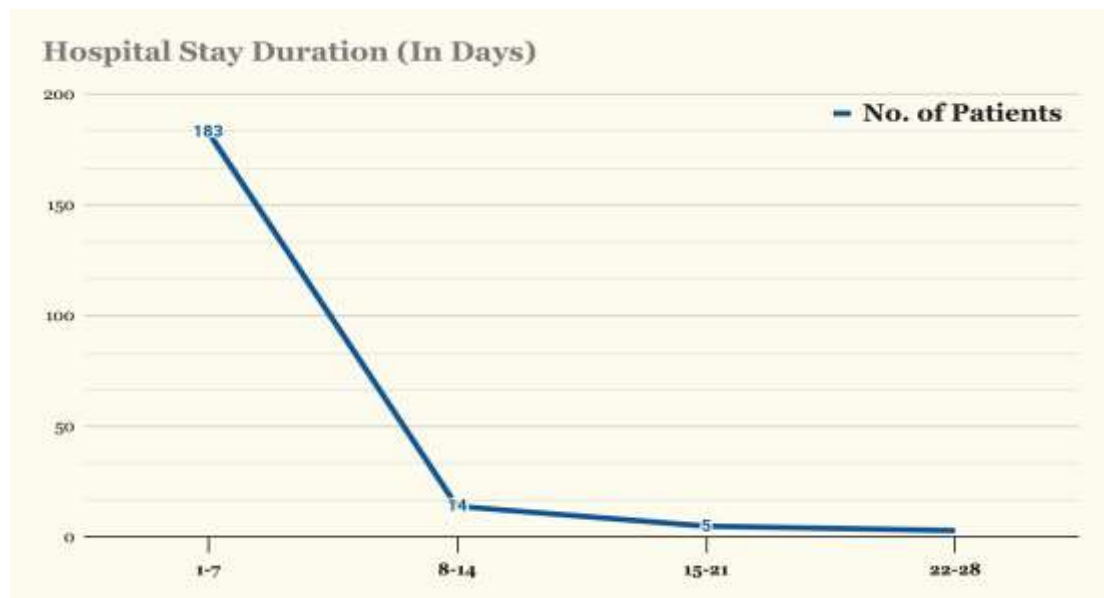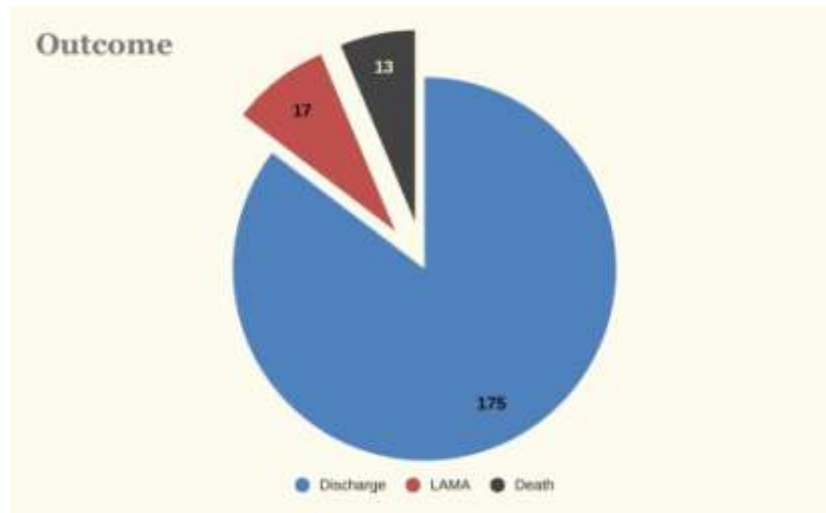
Intent Proportions:
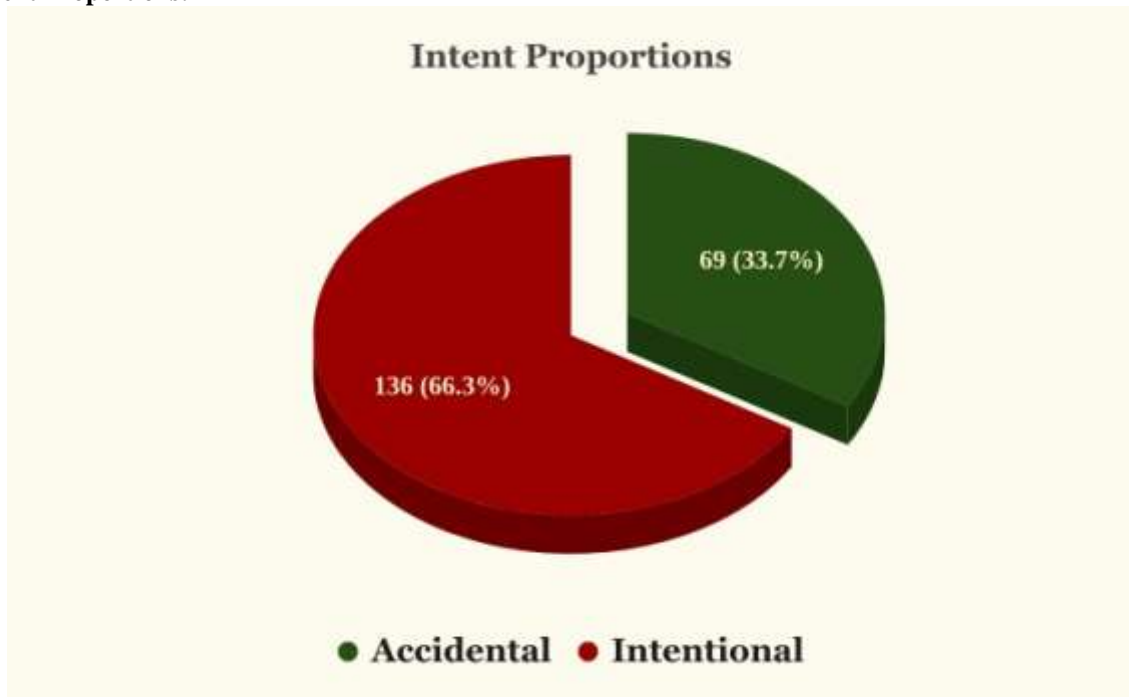
Access to Poison:

Outcome:

III. STATISTICAL INSIGHTS:

Statistical analysis using regression models indicated significant associations between specific variables. For instance, age showed a moderate positive correlation with the severity of poisoning cases, indicating that older age groups were more likely to experience severe outcomes when exposed to toxic substances.

IV. DISCUSSION:

The findings underscore the multifaceted nature of poisoning incidents, encompassing diverse demographics, temporal patterns, and intent variations. The prominence of pharmaceuticals and household chemicals as major poisoning agents warrants targeted preventive measures and public health interventions. Additionally, the observed correlations between age, intent, and severity emphasize the need for tailored strategies for different age groups and intent classifications to mitigate the impact of poisoning incidents.(Misra et al., 2023)(Lodhi et al., 2022)(Noori et al., 2022)

Understanding the temporal trends and intent-related variations can aid in the development of timely interventions and support systems, especially during vulnerable hours when the incidence of intentional poisoning is notably higher.(Karim-Nejad & Pangilinan, 2022)(Wu et al., 2022)(CPSC Marks the 60th Anniversary of National Poison Prevention Week and ..., 2022)

The dataset analysis sheds light on the intricate dynamics of poisoning incidents, providing a foundation for targeted preventive strategies, resource allocation, and clinical management protocols to mitigate the burden on healthcare systems and improvepatient

outcomes.(Chemical Safety and Health - World Health Organization (WHO), n.d)(Event- Based Surveillance of Poisonings and Potentially Hazardous ..., n.d)(Picture of Americia Poisoning Fact Sheet - Centers for Disease Control ..., n.d)

The investigation into poisoning incidents within the purview of a North Indian tertiary care hospital has revealed a tapestry of critical insights that underscore the multifaceted nature and the extensive implications of these events. This study aimed to unravel the complexities for healthcare systems and public health interventions.

Key Findings:

The comprehensive analysis of the dataset unraveled distinct demographic distributions among the affected patients. Notably, young adults between 15 to 30 years constituted a substantial portion, accounting for approximately 63% of the cases. These findings underscore the vulnerability of this age group, necessitating targeted preventive strategies and educational interventions tailored to this demographic.

Temporal analysis shed light on intriguing patterns regarding the timing of poisoning incidents. The division between day and night consumption exhibited a near-equivalent split, hinting at a plausible correlation between leisure hours and the increased occurrence of these incidents. Moreover, the classification based on intent revealed a stark contrast between accidental and intentional cases, with intentional poisonings, including suicide attempts, constituting the majority (around 66%) and exhibiting a higher frequency during late hours.

The spectrum of poisoning agents was diverse, with pharmaceuticals, household chemicals, pesticides, and venomous bites prominently featured. Notably, pharmaceuticals emerged as the predominant contributor, constituting nearly 40% of the total cases. Understanding the prevalence of these agents is pivotal in tailoring preventive measures and ensuring proper handling and storage of these substances.

Clinical outcomes varied significantly based on the intent and type of poisoning agent.

Accidental poisonings generally resulted in mild to moderate clinical presentations and a high rate of recovery upon treatment. Conversely, intentional poisoning incidents, particularly Correlation analyses revealed intriguing associations between age groups and the types of poisoning agents involved. Young adults displayed a predilection towards pharmaceutical poisonings, whereas incidents related to pesticides were more prevalent among older adults, especially those above 60 years. Furthermore, intent exhibited a strong correlation with severity, emphasizing the need for tailored interventions based on the intent classification.

Implications and Interventions:

The implications of these findings resonate across healthcare systems and public health domains. Targeted interventions aimed at different age groups, especially focusing on educating and raising awareness among young adults, are imperative in mitigating the prevalence of pharmaceutical poisonings. Strategic educational campaigns, along with stringent regulations concerning access and proper storage of medications, could significantly curb unintentional ingestions.

The temporal association between certain hours and the intent behind poisoning incidents highlights the critical need for support systems and interventions during vulnerable periods, especially during late hours. Establishing helplines, crisis intervention services, and bolstering mental health support during these times could potentially deter intentional poisoning attempts.

The prominence of pharmaceuticals and household chemicals as major poisoning agents emphasizes the necessity for public health initiatives that encompass proper labeling, storage guidelines, and educational campaigns aimed at households and healthcare providers.
Increased awareness regarding the risks associated with these substances and their safe handling could substantially reduce inadvertent poisonings.

V.   CONCLUSION:

In conclusion, this comprehensive study underscores the need for multifaceted interventions and targeted strategies tailored to the distinct patterns and demographics associated with poisoning incidents. By leveraging these insights, healthcare systems can enhance preventive measures, bolster clinical management protocols, and implement tailored interventions aimed at mitigating the burden imposed by these incidents on both healthcare infrastructures and affected individuals. The integration of these findings into policy-making and public health initiatives holds the promise of significantly reducing the incidence and impact of poisoning events within similar healthcare settings.

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