EDITORIAL

Toxicoepidemiology of Acute Poisoning: A Classic Tale of Two Indias

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Acute poisoning remains a common problem, with many patients requiring hospitalization and even intensive care unit (ICU) admission. The reported mortality associated with acute poisoning is as high as 75%.[1] Early diagnosis and identification of the offending agent, to initiate appropriate therapy, is imperative to improve outcomes. Identification of the offending agent largely depends on reliable clinical history and the presenting toxidrome. However, history may not be forthcoming in many of these cases as suicidal ideation is the most common cause for acute poisoning.[2] Further, interpretation of toxidrome may be challenging because of overlapping symptoms and frequent coingestions.[3] Hence, understanding the regional toxico-epidemiological profile becomes crucial to make the diagnosis and to decide initial empirically appropriate therapy.

The choice of poisoning agent largely depends on the ease of availability. Traditionally, it was reported that the studies originating from the Western developed countries reported over-the-counter and prescription drugs as the most common cause of poisoning.[4] However, the Asian and African countries, being primarily agrarian economies, reported pesticides as the commonest poisons.[2] But with increasing urbanization and changing economic and social milieu, this divide is no longer that apparent. Further, in a country as large and as diverse as India, the prevailing geographical, cultural, economic, and social differences across the country may have a profound impact on the toxico-epidemiological profile of the patients. These factors have further divided the studies originating from different regions by virtue of rural and urban populations, metro vs non-metro cities, southern and northern India, government and private hospitals, and ICU and non-ICU patient populations. Because of wide variations in the availability and choice of poisoning agent, clinical course, and patient outcomes, it becomes imperative to consider all these factors while translating the data from these epidemiological studies to your toxicology practice.

Studies originating from urban centers exhibit a pattern much similar to the Western World or developed countries whereby the most commonly employed agents of poisoning are drugs, including pharmacological agents, e.g., over-the-counter prescription drugs and drugs of abuse.[3,5] Drugs are responsible in as many as 46.4% and agricultural pesticides are responsible in a mere 4.3% of cases.[3] Data suggests that educational and socioeconomic status may also affect the choice of poisoning agent, with more educated and more affluent people opting for pharmacological over agricultural agents.[2,5] Even though agricultural poisons, including insecticides and pesticides, are responsible for only a minority of poisonings in urban settings, they continue to be associated with the majority of deaths.[3] Further, increasing use of newer drugs of abuse (e.g., designer drugs) in urban population, may complicate the clinical picture as they are more difficult to diagnose because they do not fit in specific toxidromes and are not detected in routine urine and blood toxicology screens.[6] Moreover, coingestion of these designer drugs with alcohol and/or other traditional drugs of abuse such as opioids and benzodiazepines could cause a diagnostic and therapeutic conundrum.

There is also a variation in the type of poisoning based on the geographical regions of the country. Even though agricultural poisons remain predominant, the northern regions report a higher rate of aluminium phosphide poisoning, whereas organophosphates remain more common in the southern part of India.[7–10] As aluminium phosphide is a low-cost, readily available, and effective rodenticide, it is commonly used for grain preservation in northern India. However, due to severe toxicity and high mortality (up to 100% in some studies) associated with its ingestion, legislative measures have been introduced to discourage its production and use.[3] This has led to a change in the spectrum of poisoning, and more recent reports have shown a decreasing prevalence of aluminium phosphide poisoning.[11] Even the male-to-female ratio as victims of poisoning varies regionally, with northern regions reporting the highest ratios and southern regions the lowest, with some centers even reporting female predominance.[2,12]

Overall, the incidence of acute poisoning is higher among Indian males, especially in the studies reported from northern India, but there are differences in the preferred agents of poisoning based on sex. Among males, the commonest agents are pesticides but among females, preferred agents are pharmacological drugs.[2,5]

Further, the age of the patient population studied also has an impact on the agent of poisoning. In adults, pesticides are the

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most common agents for acute poisoning (65.3%). On the other hand, among the children, the most common offending agents are household poisons, including kerosene, kitchen or bathroom disinfectants, and corrosives, accounting for more than 55% of cases. It is noteworthy that corrosive ingestion is reported to be nine times more common in children as compared to adults.[2]

Time is another factor that may affect the toxicoepidemiology. With the modernization of agricultural practices, better education, increasing affluence of the population, advances in healthcare management, availability of primary aid for a larger population, and changes in cultural and social aspects, the choice of poisoning agents may also evolve.[11] This may necessitate periodic evaluation of the changing trends in poisoning, both countrywide and region-specific.

Despite their differences, there are some common factors reported by these studies, including the young patient profile with the highest incidence among 20–29 years, intentional self-harm being the commonest cause for acute poisoning, and ingestion being the commonest route, followed by the inhalation, and the dermal exposure being rarely reported.[2,3,11–13]

The recent issue of the Indian Journal of Critical Care Medicine published a retrospective study from a government medical college hospital evaluating data from 2,123 patients admitted with acute poisoning. In addition to illuminating the sociodemographic profile of the patients with acute poisoning, this study aimed to delineate the myriad factors associated with increased mortality. The study population is mainly comprised of young males, predominantly from rural areas. Insecticides were the most common cause of poisoning (27%) and drug-related poisoning was reported in only 13% of cases. The overall mortality rate was 5.2% and through a meticulous analysis, this study reported admission neurological status, measured by the Glasgow coma scale (GCS) score, as the only factor exhibiting a statistically significant association with mortality.[14]

This study has several merits, including a relatively large cohort size. The collated data included the ICU course, the need for organ support, and evaluated factors associated with increased mortality. However, it included a mixed patient population admitted to the wards and ICU. The current study underscores the importance of continued monitoring of local trends and patterns of acute poisoning and the information garnered from this study will help in gaining a nuanced understanding of the pivotal toxico-epidemiological factors prevalent in southern India.

In spite of several studies evaluating the sociodemographic profile of patients with acute poisoning, only a few have tried to assess the factors associated with increased mortality.[12–14] This could be partly explained by the fact that most of these studies are single-center retrospective studies with small sample sizes and low mortality rates. Some of the factors that have been reported to be associated with higher mortality include male gender, pesticide ingestion, admission GCS, admission acute physiology and chronic health evaluation (APACHE) II and sequential organ failure assessment (SOFA) scores, development of renal failure or acute respiratory distress syndrome (ARDS) and need for organ support (vasopressors or invasive mechanical ventilation).[12–14] However, to have a better understanding of these risk factors multicenter large-scale trials are warranted.

Acute poisoning is a global phenomenon, but the spectrum of poisoning varies in different countries and even within a country. Each region may be developmentally unique with varying sociodemographic circumstances giving it a distinct toxicological profile. To enhance clinical care and improve the recovery trajectory of the patients in the domain of critical care toxicology, it is essential to conduct large-scale, as well as regional toxico-epidemiological studies, periodically. The insights amassed from such studies may assist not only in establishing early diagnosis and initiating targeted interventions but also in identifying the high-risk groups and devising the preventive strategies to mitigate the menace of acute poisoning.

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