A Knowledge, Attitude and Practices Study on Clinical Toxicology among Internees and Registered Medical Practitioners at a Tertiary Care Hospital

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Abstract

The present KAP study aimed to ascertain the knowledge, attitudes, and practices on clinical toxicology among internees and medical doctors at ACSR Govt. Medical College & Hospital, Nellore, Andhra Pradesh, India, in the light of implementing new National Medical Commission curriculum (Graduate Medical Regulations 2019). The study also aimed at understanding the knowledge and training gaps pertaining to clinical toxicology in the target population and thereby propose interventions for proper delivery of toxicology curriculum.

A semi structured questionnaire was used to elicit information wherein 120 health care providers voluntarily participated in the study. The results detected significant deficits towards understanding concepts in clinical toxicology and implementation of evidence-based approach in providing care. Our study identified the need to stress on *toxidrome based approach, use of evidence-based decontamination methods, the necessity to stabilise the patient more than being enthusiastic in diagnosing the poisoning, increased use of multidose activated charcoal as a primary antidote, use of poison control centre helpline, material safety data sheet & toxicology databases when in doubt, employing holistic care models, providing education on social & preventive toxicology and role of screening in chronic paediatric poisonings.*

Keywords: Clinical Toxicology, Medical Education, Indian Medical Graduate, Poisoning, Toxidrome.

Introduction

Clinical toxicology, as a branch of medicine, encompasses the diagnosis, management, and prophylaxis of poisoning and toxic reactions caused by exogenous substances such as chemicals, drugs, and other biological substances. It holds a critical position within the realm of medical practice because toxicological emergencies continue to be amongst the important causes of mortality in emergency medical care and intensive care settings.

In India, the relevance of clinical toxicology is more important due to high incidence of agrochemical substance poisoning and envenomations in rural parts of the country. In this context, clinical toxicology training to every health care provider assumes a vital role in safeguarding the well-being of the

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population through the provision of specialized care to patients with toxic exposures, as well as through the implementation of preventative measures such as education, research, and other initiatives.[1,2]

Materials and Methods

The present study aims to study knowledge, attitude, and practices on clinical toxicology among internees and practicing doctors at ACSR Government Medical College & Hospital, Nellore, Andhra Pradesh. A pretested semi structured questionnaire on clinical toxicology was used for this purpose. It was designed in a way to utilise the results for planning knowledge refreshing and skills training for stakeholders. The place of study was ACSR Govt. Medical College & Hospital, Nellore, Andhra Pradesh from 01 June 2021 to 31 August 2021 and data analysis was done.

Results

We received a total of 120 responses within the specified period from interns, emergency physicians, general physicians, and intensivists. A total of 100 interns, 10 general physicians, 5 emergency physicians, and 5 intensivists responded to the questionnaire. All the participants were considered as a homogenous group for the sake of convenience while carrying out analysis. A total of 69 participants (57.5%) were female and 51 participants were male (42.5%). Further, 100 participants (83.3%) were in the 20-30 years age bracket. Ten participants each belonged to the 31-40 years and 41-50 years age bracket (8.33%). Eighty-three percent (83.33%) of the study sample had only basic medical qualification, MBBS and 16.66% of the sample had a broad speciality training in their respective branch.

In response to the question on often attended cases, majority of the participants reported organophosphorus poisoning, paraquat poisoning and snake bite as common clinical toxicology scenarios they dealt with. However, it is worth to mention that a few of them also reported cases like sodium bromide, acrylic and acetone poisoning as some peculiar cases they noticed in their practice. Seventy-six percent (76.6%) of the study sample (92 Participants) were not aware of toxidrome based approach in clinical toxicology practice. Ninety-three percent (93.33%,112 Participants) of the study sample stated that they never used whole bowel irrigation as part of their practice either exclusively or in addition to gastric lavage for acute poisonings.

Eighty-nine (89) Participants responded that they rarely used multidose activated charcoal in practice, 19 participants said they used it sometimes an only 12 participants agreed that they use it routinely. Fifty-eight percent (58.33%) of the study population answered that delivering high flow oxygen using a mask in a case of paraquat poisoning is the most inappropriate treatment, 16.66% each opined that keeping vital parameters and performing gastric lavage are the inappropriate treatments and 8.33% opined doing a workup anticipating hepatorenal failure is the most inappropriate treatment.

For the question on reasons for infants not to be fed with honey, 41.6% opined it as infantile botulism, 23.3% opined it as none of the above, 22.5% opined it as addiction and 12.5% opined it as indigestion.

In response to the question on screening children for lead poisoning, 42.5% recommended X- ray of long bones, 37.5% recommended urine lead levels estimation, 12.5% recommended capillary blood lead levels estimation and 7.5% recommended venous blood lead levels estimation as the proper screening technique. Similarly, in response to the question on one pill toddler killers, 40% answered it as tricyclic anti-depressants, 21.6% answered it as verapamil, 20% answered it as clonidine and 18.33% answered it as multi drug poisoning (polypharmacy).

The participants answered about referring recovered patients to psychiatry referral this way, regularly (22.5%), sometimes (19.16%), and rarely (58.33%). Like that, the participants replied about discussing about circumstances of poisoning with colleagues this way, regularly (12.5%), sometimes (20.83%), and rarely (66.66%).

For the question on the bacterial contamination of frozen foods, 36.66% responded it as salmonella, 26.66% answered it as E coli, 23.33% answered it as Listeria and 13.33% answered it as Shigella. For the question on Vietnam bomb disease, 37.5% responded to it as Burkholderia mallei, 20.83% responded to it as Variola, 29.16% each of the participants responded to it as Coxiella and Staphylococcus aureus. Similarly, for the question on whole blood clotting test 75%

of the participants responded to it as snake bite, 8.33% of participants responded equally to the other three options. Moreover, for the question on methyl alcohol poisoning 79.16% responded to it as metabolic acidosis, 9.16% reported it as metabolic alkalosis, 7.5% reported to it as respiratory acidosis and 4.16% responded to it as respiratory alkalosis.

Seventy percent (70%) of the participants responded that Rumack Mathew Nomogram is used in management of multiple poisonings, 15.8% opined that it is used in paracetamol poisoning, 8.33% opined that it is used in arsenic poisoning and 5.83% opined that it is used in lead poisoning.

Discussion

It is nothing astonishing for us to see that almost 58.3% participants (Figure 1) admitted that the most common clinical toxicology case they attended to was poisoning due to agrochemical substance. Alcoholic coma and snake bite also constituted a significant number of common cases at our institute. Our results in this aspect are concordant with several studies in India.[3,4] However our data in this aspect may differ with some studies conducted using poison control centre data which show that household substances dominate the list of common poisonings because the poison control centre generally doesn't receive calls for clarifications in routine cases like agrochemical substance poisoning.[5] Majority of participants not being aware of the toxidrome based approach in management of poisons and believing that analytical chemistry has a great role in clinical toxicology go hand in hand, which appears to be a major knowledge gap in the study group.[6,7]

The decreased usage of multi dose activated charcoal and methods like whole bowel irrigation among the study population indicate to both infrastructural limitations at the institute and training/ skill deficiencies in the study population. Similarly, knowledge about when to proceed for stomach wash and when not to do so is lacking in the study population. It is no longer advisable to continue to do gastric lavage after a reasonable time of more than two hours elapsed after poisoning.[8] The importance of intubating every patient before performing gastric lavage and the preference of APVU/RASS scales over Glasgow Coma Scale in clinical assessment of toxicology cases was not properly impressed upon the study population during their training. There also seems to be a huge literacy gap pertaining to use of resources like Material Safety Data Sheets, Poison Control Centres, or Toxicology Databases like INTOX/ POISINDEX. (Table 1)

By the same token, there seems to be a lack of initiative among the study population towards considering toxicological causes as one of the differential diagnoses for the usual clinical presentations at casualty as majority of them failed to answer that chronic intractable headache can be caused due to carbon monoxide poisoning (Figure 2). Linked to that, the study population also did not consider chronic heavy metal poisoning as one of the causes of incorrectable anaemia.[9,10] The participants not being aware of Rumack-Mathew nomogram doesn't come as a surprise to us at all as paracetamol poisoning is extremely rare in our settings.[11]

In questions pertaining to paediatric toxicology, the knowledge about single pill killer drugs in toddlers and infantile botulism seems lacking.[12,13] The percentage of correct responses to screening children for lead toxicity favours the fact about wanting knowledge in connection with the role of screening in ascertaining exposure to chronic poisons.[14]

The answers to the questions on paraquat poisoning, supervsmol 33 poisoning (Figure 2), food poisoning and false positive results during breath analysis for alcohol (Figure 3 and Figure 4) also indicate lacunae in theoretical knowledge in the field of toxicology among study population.[15-19] Nevertheless the study population fared well on the topics of methanol poisoning and diagnostic tests used in snake bite management.[20,21] Needless to say, the study population was found to be very well versed with management of organophosphate poisonings and zinc phosphide poisoning which is why they were excluded from the questionnaire after the preliminary survey.

The practices of less psychiatric referrals and not taking up the scheme of studying the circumstances of poisonings with colleagues more often represent an attitudinal deadlock in understanding the root cause of poisonings in the community among the study population. This emphasizes the fact that the

idea of holistic care in clinical toxicology is lacking among the study populace.[22]

Based on the results of the study, we felt the strong need for vertical and horizontal integration of toxicology curriculum implementation as envisaged by NMC, GMR 2019.[23] Nonetheless, all of us know the practical difficulties of implementing the highly utopian training program with limited staff and infrastructure at our institutions. Hence, we came up with the idea of a refresher program for interns and practicing doctors annually on a fixed date at our institution. The following themes were identified as ten key areas to impart training, preparing IEC (Information, Education & Communication) material to be conspicuously displayed in the emergency room and design Continuing Medical Education (CME) programs at our institution.

1. Toxidrome based approach in diagnosis and management of poisoning.
2. Emphasis on *"treat the person, not the poison". "Refrain from searching too much for antidotes!!"*
3. Evidence Based Medicine approach towards gastric lavage and other decontamination methods.
4. The use of multidose activated charcoal in poisoning management.
5. The practice of contacting the Poison Control Centre, using MSDS & Poison databases when in doubt.
6. Preparation of institution specific treatment algorithms/workflows for agrochemical substance poisoning, snake bite and alcohol intoxication and ensure compliance of the same.
7. Holistic care model of toxicology to understand the causes and prevent recurrence of poisonings by roping in experts from public health, child health and mental health.
8. Prepare a short handbook on clinical toxicology with case study exercises for interns to complete during their orientation sessions before commencement of Compulsory Rotatory Internship (CRI).
9. Inculcating the practice of considering toxicological causes as possible differential diagnosis for common clinical and laboratory presentations in medical practice
10. Social and preventive toxicology with emphasis on drug abuse and circumstances of poisoning along with screening practices for early identification of chronic poisonings in children.

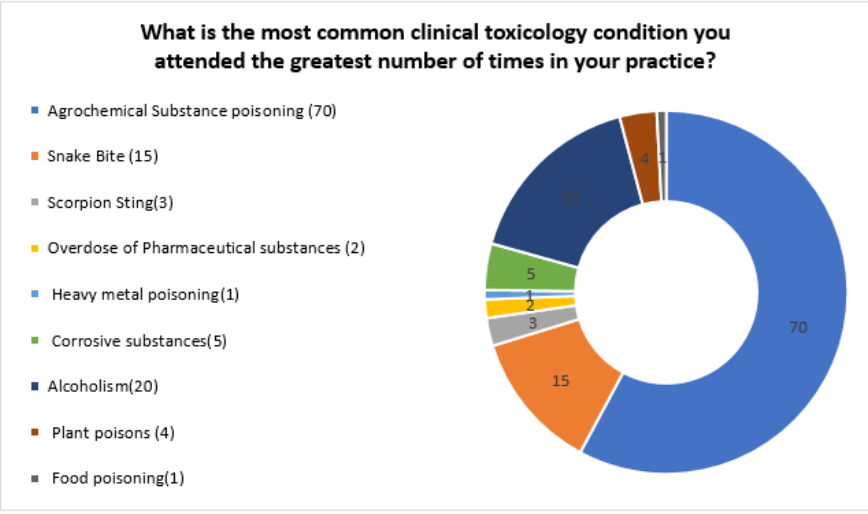

Figure 1: The profile of common clinical toxicology cases attended by the study population, (in numbers).

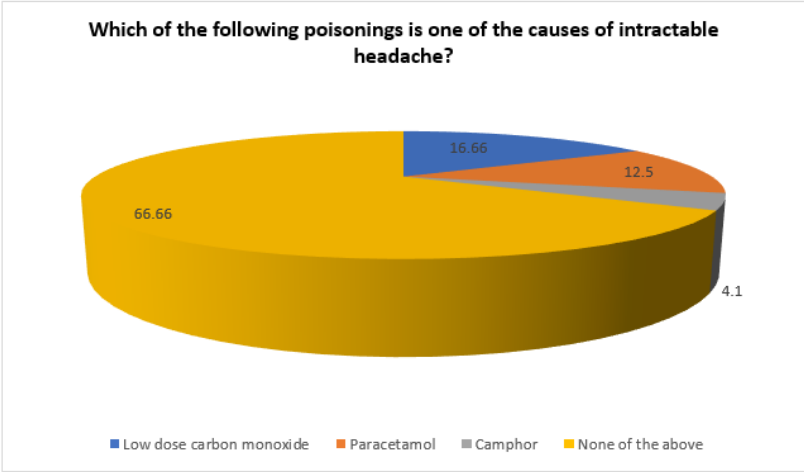

Figure 2: Participants response to the question on CO poisoning, (in percentage).

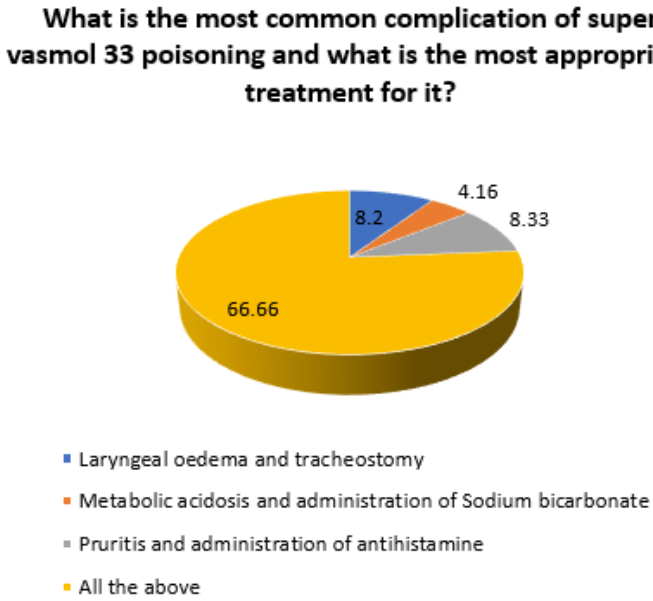

Figure 3: Participants response to the question on Super vasmol thirty-three poisoning, (in percentage).

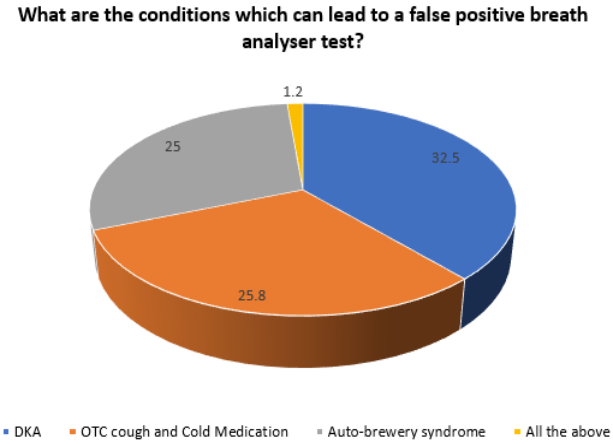

Figure 4: Participants response to the question on false positive breath analyser test, (in percentage).

Table 1: Responses of the participants to Yes/No questions

Q. No	Question	Yes (%)	No (%)
12.	Have you ever contacted a Poison Control Centre for clarifications in your routine practice? Yes/No	10	90
13	Are you aware of the Poison search databases like INTOX and POISINDEX? Yes/No	20.8	79.2
14	Do you look in to the physical or electronic material safety data sheet of the chemical consumed by the patient? Yes/No	6.66	93.34
15	Do you recommend gastric lavage in a routine case if more than hour has elapsed after the consumption of poison? Yes/No	54.16	45.84
16	Have you ever used APVU (Alert/Verbal/Painful/ Unresponsive) or RASS (Richmond Agitation Sedation Scale) for assessing the consciousness of a poisoned patient instead of the routine GCS? Yes/No	10	90
23	Have you ever considered heavy metal toxicity as one of the reasons for chronic incorrectable anaemia? Yes/No	4.16	95.84
32	Do you think the role of analytical chemistry is paramount in poisonings than clinical chemistry data? Yes/No	75	25
33	Do you believe intubating every patient before gastric lavage prevents aspiration pneumonitis? Yes/No	10	90

Conclusion

The present study finds the knowledge gaps and practice related handicaps in clinical toxicology among internees and working doctors at a tertiary care hospital. There is a strong need for attitudinal shift of doctors towards realizing our full potential in providing optimum care to patients presenting with clinical toxicology conditions. Despite implementing revised curriculum at medical colleges, we need to stress more upon the scientific aspects of clinical toxicology to our interns before commencement of their housemanship. It is worthy to conduct an annual refresher training in clinical toxicology to all health care providers working at every tertiary care institution in India.

Limitations:

The study stands for a single institution data and hence intra-institutional factors like competency of the faculty, teaching methods in vogue, skills training methods and infrastructural limitations can influence the results. The study did not much concentrate on the KAP pertaining to drugs of abuse.

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Conflicts of Interest: Nil

Ethics Committee Approval: Taken

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