



Questionnaire-Based Assessment on Knowledge, Attitude, and Practice on Management of Common Poisoning, Insecticides, Common Stings, Heavy Metal Poisoning, and Chelating Agents

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ABSTRACT

Objective- To assess the knowledge, attitude, and practice of medical undergraduates towards the questionnaire-based assessment on knowledge, attitude, and practice of a questionnaire on management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents in Medical Undergraduates.

Method- A cross-sectional questionnaire-based study was conducted among second-year medical undergraduates of GSVM, Medical College, Kanpur in the form of a pre-test, and after sensitizing the students about management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents, again the same questionnaire was given as a post-test.

Result- A total of 251 students, students participated in the pre-test 221, and 202 participated in the post-test. The percentage of male students in pre-test was higher (62.44%) compared to female students (37.56%).

Conclusion- The inclusion of these topics in the undergraduate curriculum is a good initiative by NMC but there is a need to conduct more CMEs, symposiums, and workshops in medical colleges to update the knowledge regarding management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents in Medical Undergraduates among medical undergraduates.

Keywords: Drug, Students, Pre-test, Post-test, Poisoning.

INTRODUCTION

Any substance that causes deleterious, unwanted, and harmful effects on the body is called poison. It may be due to overdose or prolonged use of a drug. Poisoning can be acute or chronic. Short-time exposure to poison is called acute poisoning whereas repeated, long term or continuous is called chronic poisoning. In chronic poisoning, symptoms may not be seen after each exposure and may be seen after a long period. Poison can cause effects when they are orally taken, injected, swallowed, inhaled, or even rubbed on the skin. Commonly observed poisons are pesticides, organophosphates, carbon monoxide, heavy metals, and common sting certain plants such as datura, cannabis, opium, etc. The branch of medicine that deals with the study of detection, clinical features, types, diagnosis of poison, and treatment of poisoning is called toxicology and the person trained in this stream is called toxicologist¹. The poisoning is the major cause of death everywhere although type and morbidity vary among the persons. Death occurring due to poisoning is regarded as unnatural death and to confirm it medico-legal autopsy is routine practice. The children are more curious about household things and they accidentally ingest them causing poisoning. The incidence of poisoning is higher among toddlers and preschool children, which is due to their developmental phase². High doses of analgesics, tranquilizers, and antidepressants are the commonly used agents for intentional poisoning in industrialized countries³. Briefly, all drugs in excess can cause poisoning. The effect of poisoning ranges from short-term illnesses such as rash, diarrhea, seizures,

dilated pupils, and nausea to long-term complications such as organ damage, coma, or even death. Poisoning can be accidental, homicidal, or suicidal. The diagnosis of poisoning is based on assessing clinical features history, physical examination, and toxicological screening. Toxic effects must be carefully monitored and treated immediately to save the life of a patient. Assessing the symptoms of poisoning, providing life support to maintain vital signs, eliminating poison, preventing further exposure to poison, and use of antidotes are the basic principles of management of toxicity. With this background, it becomes essential and interesting to elaborate on the detailed study of poisoning and its management. The present article planned to know the types, nature, principles, diagnosis, effects, and general management of poisoning.

MANAGEMENT OF COMMON POISONING

Management of poisoning is based on stabilization & evaluation of the patient, decontamination, and elimination of poison and with antidote administration⁴. In stabilization of patient, assessment of patient and vital signs are carefully monitored and maintained. In evaluation of patient, hyperthermia, hypothermia, acid-base disorders, convulsions, electrolyte disturbances, and movement disorders are noted. In decontamination, the impact of poison is reduced, In elimination, poison is eliminated by forced diuresis, hemodialysis, hemoperfusion, and hemofiltration, and in antidote administration, a suitable agent is administered to patient which counteracts the effect of poison⁴.



Insecticides: The insecticide is any toxic substance that is used to eradicate and control insect populations, these include ovicides and larvicides for eggs and larvae, respectively. The earliest documented insecticide compounds are sulfur, heavy metals, salts, and even plant extracts e.g. *Chrysanthemum cinerariifolium* formerly known as *Dalmatian pyrethrum*^{5,6}. The global pesticide consumption in 2019 was approximately 4.19 million metric tons, where China was by far the largest pesticide-consuming country consuming 1.76 million metric tons, followed by the United States 408 thousand tons, Brazil 377 thousand tons, and Argentina 204 thousand tons⁷. Organophosphates block AChE and accumulate acetylcholine buildup at Neuromuscular Junctions, resulting in the fast twitching of voluntary muscles and paralysis⁸.

Common Stings: Insect stings can cause severe complications. Anaphylaxis due to bee or wasp stings is a common event. The most common type of reaction to an insect sting is a local reaction to the bite of a mosquito and systemic manifestation by scorpion stings. The reaction reflects an allergic response to proteins in the insect's saliva, leading to an immediate allergic reaction (wheal) and delayed reactions (papule)⁹. Specific immunotherapy protects susceptible persons from further, potentially life-threatening reactions.

Heavy Metal Poisoning and Chelating Agents: Chelation therapy has historically been used in attempts to reduce the body burden of toxic metals in highly symptomatic patients with elevated biological markers^{10,11}. Acute and chronic intoxications with mercury, iron, lead, arsenic copper compounds, etc. can be treated efficiently by using chelation therapy. The efficiency of the relatively new chelating agents meso-2,3-dimercaptosuccinic acid (Succimer or DMSA) and D,L-2,3-dimercapto-1-propanesulfonic acid (DMPS) in lead and mercury poisoning has turned out to be superior to that of classical chelator 2,3-dimercaptopropanol (British Anti Lewisite, BAL). 2,3-Dimercaprol (BAL) is a traditional chelating agent developed by British biochemists at Oxford University during World War II¹². It has been used clinically since 1949 in arsenic, cadmium, and mercury poisoning. In lead poisoning chelation therapy is recommended in symptomatic cases or where blood lead levels are high (50–60 µg/dL)¹³. In the environment, humans and animals are exposed to numerous chemical forms of mercury, including elemental mercury vapor (Hg), inorganic mercurous [Hg (I)], mercuric [Hg (II)], and organic mercuric compounds. DMPS is the drug of choice to reduce the burden of alkyl mercury from the body including the brain¹⁴.

Arsenic toxicity is associated with various hepatic, renal, neurological, and skin disorders. At chronic exposure, it is known to also produce carcinogenic effects. Arsenic is rapidly and extensively accumulated in the liver, where it inhibits NAD-linked oxidation of pyruvate or α -ketoglutarate. Succimer or DMSA has been tried

successfully in animals as well as in cases of human arsenic poisoning¹⁵. D-Penicillamine (DPA) is used mainly as a chelating agent in heavy metal toxicity viz. lead, mercury, and copper poisoning (Wilson's disease)¹⁶. Iron overload is a less frequent condition, but a high content of tissue iron has been associated with several pathological conditions, including liver and heart diseases¹⁷, cancer¹⁸, neurodegenerative disorders¹⁹, diabetes, and immunological disorders²⁰. Deferoxamine is the specific and most potent chelator for iron and known for its high affinity. Most of the currently used chelating agents have serious side effects²¹.

A new trend in chelation therapy is to use two structurally different chelators observed that combined administration of DMSA and CaNa₂EDTA against chronic lead poisoning led to a more pronounced elimination of lead and better recoveries in altered lead-sensitive biochemical variables besides no redistribution of lead to any other organ, was noticed. The combination therapy is an approach to ensure enhanced metal mobilization from the body, reduction in the dose of potential toxic chelators, and no redistribution of toxic metal from one organ to another following chronic metal exposure^{22,23}.

METHODS

This is a Cross-sectional study. It was conducted by the Department of Pharmacology, GSVM Medical College, Kanpur. A questionnaire-based survey assessing the knowledge, attitude, and practice of second professional medical undergraduates on the topic management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents. A self-designed structured questionnaire has been prepared consisting of 17 questions using a 4-point like scale on Google form and each participant was explained the objective of the study. Consent was taken from the students. The link to the questionnaire has been shared. Firstly, the questionnaire was administered as a pre-test. The pre-test defined the baseline knowledge and attitude, the practice of students regarding topic management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents. After sensitizing the students by taking lectures on management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents the same pre-test questions were given in the form of a post-test. Students were given 10 min to give the response. Data were reported as frequencies and percentages.

RESULTS

Out of the total 251 students, 221 students participated in the pre-test and 202 students participated in post-test. Total male participants in pre-test 62.44% and post-test were 65.84% While female participants were 37.56 % and 34.16 % in pre and post-test respectively. Most of the students are between 19 and 21 years old in both pre (50.67%) and post-test (52.47%).



Demographic details and assessment of student’s knowledge and attitude on both pre-test and post-test have been shown in table 1.

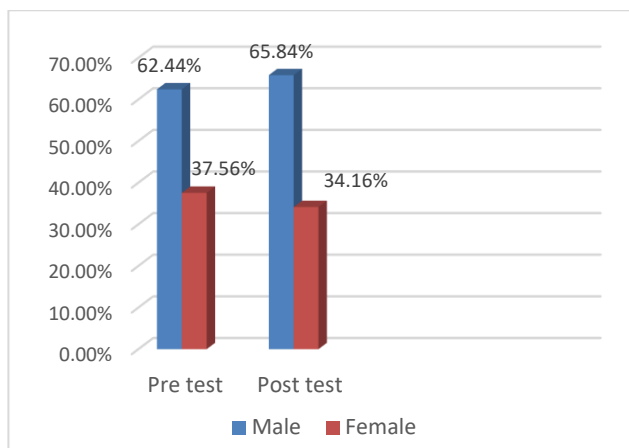


Figure 1: Male: female ratio pre-test and post-test

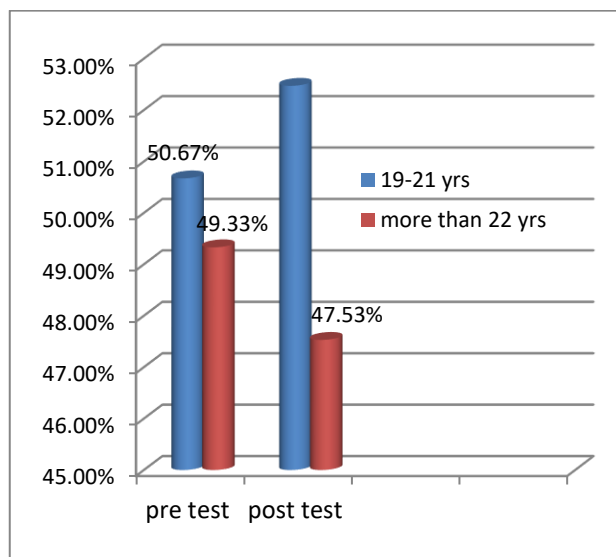


Figure 2: Age distribution pre-test and post-test

Table 1: Demographic details of males and females with age distribution in pre-test and post-test

Variable	Characteristics	Pre-test (n=221)	Post-test (n=202)
		Frequency (%)	
Gender	Male	138(62.44%)	133(65.84%)
	Female	83(37.56%)	69 (34.16%)
Age	19-21years	112 (50.67%)	106 (52.47%)
	More than 22 years	109 (49.33 %)	96 (47.53%)

Table 2: Responses of students on the KAP-based pre-test and post-test questionnaires

S.no.	Questionnaires				
	Knowledge-based question				
1.	Are you aware of the term poisoning				
		Yes	No		
	Pre-test	99.5%	0.5%		
	Post-test	99.5%	0.5%		
2.	If yes then source of knowledge				
		Academic books	Internet	Research article	Others
	Pre-test	62.5%	25.5%	0.0%	12.0%
	Post-test	86.5%	9.0%	0.5%	4.0%
3.	Are you aware of the different types of insecticides				
		Yes	No		
	Pre-test	86%	14%		
	Post-test	91.1%	8.9%		
4.	If yes then source of knowledge				
		Academic books	Internet	Research articles	Others
	Pre-test	50.2%	31.8%	0%	18.0%
	Post-test	71.5%	23.5%	0%	5.0%
5.	Are poisons and toxins are same				
		Yes	No	Not sure	
	Pre-test	4.1%	71.0%	24.9%	
	Post-test	1.5%	89.5%	9.0%	

Attitude and practice-based questions					
6.	Do you think proper knowledge about the management of different poisoning is required in India				
		Yes	No		
	Pre-test	94.1%	5.9%		
	Post-test	97.4%	2.6%		
7.	Do you think that acquiring proper knowledge about the management of different poisonings will improve the quality of life of people in India?				
		Yes	No		
	Pre-test	91.4%	8.6%		
	Post-test	95.6%	4.4%		
8.	Are all the snakes poisonous?				
		Yes	No		
	Pre-test	36.3%	63.7%		
	Post-test	2.5%	97.5%		
9.	Which insecticides inhibit the acetylcholinesterase enzyme				
		Organophosphate	Carbamates	Both a and b	None of the above
	Pre-test	12.2%	4.8%	82.8%	0.2%
	Post-test	5.5%	2.9%	91.5%	0.1%
10.	Drug of choice for scorpion sting				
		Terazosin	Prazosin	Temsulosin	ASV
	Pre-test	13.6%	57.5%	12.2%	16.7%
	Post-test	9.5%	81.5%	7.0%	2.0%
11.	ASV is polyvalent which is developed from how many species of snake				
		4	6	5	3
	Pre-test	22.2%	28.1%	27.6%	22.2%
	Post-test	81.3%	8.7%	5.2%	4.8%
12.	Desferrioxamine is the antidote of choice for				
		Copper poisoning	Iron poisoning	Lead poisoning	Mercury poisoning
	Pre-test	9.0%	55.7%	25.3%	10.0%
	Post-test	4.5%	87.5%	5.3%	2.7%
13.	Penicillamine is effective against which of the following condition				
		Iron toxicity	Mercury poisoning	Wilson disease	Lead poisoning
	Pre-test	16.3%	26.7%	32.1%	24.9%
	Post-test	12.4%	14.4%	56.9%	16.3%
14.	Gastric lavage is indicated for all cases of poisoning except for				
		Ingested kerosene	Corrosive substances	Both a and b	None of the above
	Pre-test	18.1%	19.0%	48.9%	14.0%
	Post-test	8.5%	16.5%	71.3%	3.7%
15.	Atropine should be administered during organophosphate poisoning				
		Strongly agree	Agree	Disagree	Not sure
	Pre-test	25.3%	40.7%	12.4%	21.6%
	Post-test	67.7%	21.3%	7.0%	4.0%
16.	Treatment consists of supportive care and GI decontamination by gastric lavage with potassium permanganate				
		Strongly agree	Agree	Disagree	Not sure
	Pre-test	14.5%	48.9%	6.3%	30.3%
	Post-test	55.9%	21.3%	5.1%	17.7%
17.	Once in practice, I should be able to spread awareness regarding the proper knowledge of different types of poisoning and their management				
		Strongly agree	Agree	Disagree	Not sure
	Pre-test	26.7%	40.3%	14.9%	18.1%
	Post-test	83.5%	13.7%	0.8%	2.0%



From the above table, we concluded that most negative responses are converted into positive ones during the post-test. Out of 221 students, 99.5% in the pre-test, and post-test, were aware of the term poisoning. In our study sources of knowledge are academic books 62.5% in pre-test and 86.5% in post-test, Internet (25.5%) in pre-test, and 9% in post-test.

In pre test 86% student were aware of the different types of insecticides while in post test 91.1% students aware. source of knowledge of insecticides are academic books 50.2% in pre test and 71.5% in post-test, Internet (31.8%) in pre test, and 23.5% in post-test.

The questions regarding poisons and toxins are same in the pre-test 71% students and post -test 89.5% of students gave correct responses.

The majority of the students in the pre-test 94.1% already have attitude about knowledge of management of different types of poisoning as shown in figure-3 and the correct response slightly increased to 97.4 % in post-test.

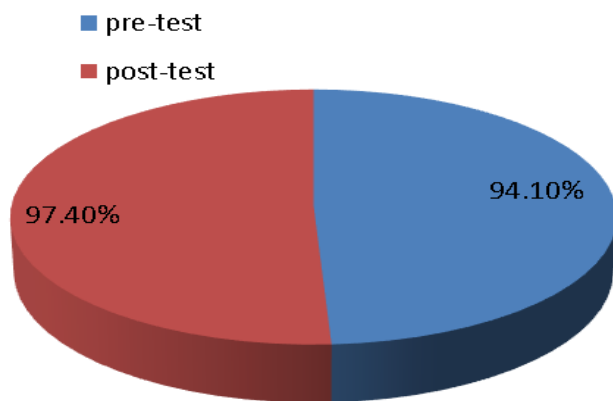


Figure 3: Pre- test and Post-test response of Attitude about knowledge of management of different types of poisoning

DISCUSSION

This study evaluates a questionnaire on management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents. The majority of the participants were male both the pre-test and post-test. In our study, there were 83 female participants in pre test and 69 participants in post test. In the pre-questionnaire, it was evident that there were gaps in knowledge, attitudes, and practices related to these areas. Knowledge levels varied, with certain aspects better understood than others. Attitudes were diverse, and best practices.

Sources of information on management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents include Internet, academic books, Research articles, and other sources. Before the lecture, the majority of the students had prior knowledge about aware of Poisoning management, with 81.7% on the pre-test and 92.9% providing correct responses in the post-test. In our study, 86% of student in pre-test were aware of the different types of insecticides, and this percentage increased to 91.1% of the students providing correct

responses in the post-test. More than 90% of the students in pre and post-tests know all snakes are not poisonous. Only 25.3% in pre-test and this percentage increases to 67.7% in the post-test gave correct responses about the atropine should be given organophosphate poisoning. In post-test practice-based question, should be able to spread awareness regarding the proper knowledge of different types of poisoning and their management also improved by 83.5%.

The post-questionnaire revealed some positive changes. There was a notable improvement in knowledge, and this was reflected in the increased percentage of correct responses in the post-survey compared to the pre-survey. This suggests that educational efforts or interventions have had a positive impact on increasing awareness and understanding of these topics.

Attitudes showed some positive shifts, indicating that participants were more receptive to adopting safer and more environmentally friendly practices.

Limitation

These topics are new in the curriculum of medical undergraduates so there is no questionnaire-based study has been found to compare them.

CONCLUSION

It can be concluded well from this study that the majority of the students have prior knowledge about management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents, and their attitudes, as well as practice, are positive and agreeable to the questions being asked to them. Our study also serves as a better means to increase the knowledge of the students about management of common poisoning, insecticides, common stings, heavy metal poisoning, and chelating agents as evidenced by the comparison of the percentage of correct responses in pre-test and post-test analysis.

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