

Clinical and demographic characteristics of geriatric patients with acute poisoning in the state of Uttarakhand

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ABSTRACT

Background: Acute poisoning in geriatric age group is a clinical challenge due to multiple comorbidities and complications in this age group. There are very few studies done in the past, which have addressed this issue. **Materials and Methods:** This retrospective observational study was carried out in the Department of Emergency Medicine of a tertiary care hospital of Uttarakhand over a period of 1 year from November 2017 to October 2018. Detailed demographic data and clinical history of patients with alleged history of acute poisoning was obtained from the hospital record section. **Results:** During the period of 1 year, 156 patients of acute poisoning attended the medical emergency department, of which 53 (33.9%) patients belonged to geriatric age group (>60 years). Maximum number of patients belonged to the age group of 71–80 years ($n = 26$, 16.6%). Males outnumbered female patients. The most common toxidrome in geriatric age group was alcohol intoxication followed by pesticide (organophosphorus) poisoning. Unintentional exposure of toxin in the form of drug over dosage encompassed more than one-third of poisonings in geriatric population. Nine (16.9%) geriatric patients succumbed to poisoning. Complications such as acute renal failure, shock, respiratory distress, acute liver injury, and need for ventilator support were more common in nonsurvivors as compared with survivors. **Conclusion:** The study demonstrated mortality of 16.9% ($n = 9$) among geriatric patients with alleged history of acute poisoning. The risk factors attributing to mortality were shock, aspiration pneumonia, and acute liver injury. Although cases of suicidal exposure outnumbered cases of unintentional exposure, the latter group comprised of a considerable number. Clearly, more attention is needed while managing a case of acute poisoning of geriatric age group as their pattern of presentation and complications differ from that of younger age group.

Keywords: Geriatric, organophosphorus, poisoning, toxidrome

Introduction

The rate of intentional poisoning is on the rise worldwide. It is considered one of the major health challenges both in developing as well as developed countries.^[1,2] Geriatric patients that mean patients >60 years of age comprise of only 2.3%–5.3% patients of acute poisoning. This subgroup of patients have various comorbidities and thus can develop multiple complications.^[3,4] The proportion of acute poisoning cases can be possibly higher in the community as a significant number of patients do not

report to hospital.^[5] Drug over dosage, both intentional as well as unintentional, constitutes an important cause of acute poisoning in geriatric patients.

Drug toxicity can have serious implications in this age group as a consequence of coexisting comorbidities in geriatric patients. The comorbidities can directly or indirectly have an impact on pharmacodynamics as well as pharmacokinetics of the poison consumed by the patient. Thus, these patients need more attention.^[6]

There are multiple causes of suicidal attempts in older patients. They comprise of chronic ailments, financial insecurities, social

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neglect, and depressive illness. According to the previous studies, around 90% cases of suicidal deaths have underlying psychiatric disorder.^[7]

Thus, the study aimed to study the potential causes of acute poisoning in geriatric patients (pattern and clinical outcomes) in a tertiary care hospital of Uttarakhand.

Materials and Methods

This retrospective study was carried out in Emergency Medicine Department of a tertiary care hospital of Uttarakhand between the year 2017 and 2018. The data of all the patients of suspected poisoning were collected and tabulated from the hospital record section. The patients were divided in two categories, younger patients comprised of patients >60 years, whereas geriatric patients comprised of patients >60 years of age. Spectrum of toxidromes was studied in the two groups. The geriatric patients were further divided as survivors and nonsurvivors. Demographic parameters, clinical signs, and symptoms as well as complications of poisoning were compared between the two groups. Mortality-related risk factors were studied in geriatric patients with acute poisoning.

The identification of poisons was done by history obtained from the patient, family relative as well as qualitative and quantitative assessment of blood and urine samples. Detailed history of underlying comorbidities was obtained from all the patients. Predisposing and underlying psychiatric conditions triggering suicidal attempts were assessed and tabulated.

Causes of acute poisoning were divided as unintentional and intentional toxin exposure. The toxins were classified organophosphorus poison, benzodiazepines drug, oral hypoglycemic agents, antiplatelet drugs, alcohol intoxication, snake bite, antipsychotics, antidepressants, selective serotonin reuptake inhibitors (SSRI), rat poison, opioid, scorpion bite, paracetamol, mixed group, and unknown group. The mixed group comprised of patients who were exposed to more than one poison, whereas the unknown group comprised of patients in whom the poison could not be detected.

Data Analysis was done using SPSS version 20. Chi-square and Fischer's exact test were used to compare parameters between different groups. For analysis of continuous variable data, Mann-Whitney *U*-test was used. *P* values <0.05 was considered significant.

Results

About 156 patients of acute poisoning attended emergency medicine department from year 2017 to 2018, of which 53 (33.9%) patients belonged to the geriatric age group (>60 years of age). Demographic parameters, clinical signs, symptoms, and complications of all the patients of acute poisoning are summarized in Table 1.

Table 1: Demographic and clinical characteristics of all patients of acute poisoning (n=156)

Male	119 (76.3%)
Female	37 (23.7%)
Married	92 (58.9%)
Uneducated	85 (54.4%)
Unemployed	37 (23.7%)
Driver	21 (13.4%)
Guard	19 (12.1%)
Student	15 (9.6%)
Unknown profession	64 (41%)
Fever	5 (3.2%)
Tachycardia	12 (7.6%)
Bradycardia	39 (25%)
Tachypnoea	94 (60.2%)
Shock	27 (17.3%)
Hypertension	62 (39.7%)
Miotic pupils	34 (21.7%)
Mydriatic pupils	3 (1.9%)
Dry skin	16 (10.2%)
Increased sweating	33 (21.1%)
Altered sensorium	59 (37.8%)
Agitated	22 (14.1%)
Vomiting	18 (11.53%)
Diarrhea	21 (13.4%)
Urinary incontinence	22 (14.1%)
Hypoglycemia	10 (16.4%)
Intentional exposure	122 (78.2%)
Unintentional exposure	34 (21.7%)

Demographic and clinical characteristics of geriatric patients of acute poisoning were summarized in Table 2. Clearly males ($n = 32$, 60.4%) outnumbered females ($n = 21$, 39.6%). Thirty-seven (69.8%) geriatric patients had intentional exposure of toxins and 11 (20.7%) had unintentional exposure of toxins. More than one-third of geriatric patients had accidental exposure to toxins. This group included exposure to drugs (oral hypoglycemic agents, antiplatelet agents, and benzodiazepines). Altered mentation was the most common symptom of presentation ($n = 30$, 56.6%). Fourteen (26.4%) patients were shifted to intensive care unit. Nine (16.9%) patients succumbed to death. Alcohol intoxication followed by organophosphorus poisoning were the most common toxidrome both in younger (<60 years) as well as geriatric (<60 years) [Table 3]. Poisoning with drugs such as benzodiazepines, oral hypoglycaemic agents (OHA), SSRI, and antiplatelet drugs were significantly more in geriatric age group as compared with younger patients. On the contrary, younger patients were significantly more exposed to toxins such as snake bite toxin, antipsychotics, opioids, scorpion bite toxin, and paracetamol [Table 3].

Nine patients (16.9%) succumbed to death. As evident complications such as renal failure, pneumonia, ARDS, shock, low GCS (Glasgow Coma Score <8), acute liver injury, prolonged intensive care stay, and need for ionotropic support were more commonly associated with nonsurvivors.

Among the nonsurvivors, alcohol intoxication followed by organophosphorus poisoning was the most common toxidromes. One patient was admitted with a history of unknown poisoning. Patient had cardiac arrest within half an hour of presentation in the emergency department. Out of the nine nonsurvivor patients, three (33.3%) patients had presented with a history of alcohol intoxication, two (22.2%) had a history of organophosphorus poisoning, one (11.1%) patient each of snake bite, SSRIs, and unknown poisoning had attended emergency medicine department.

Table 2: Demographic, clinical characteristics and comorbidities of geriatric patients of acute poisoning (n=53)

	Male (n=32) (60.3%)	Female (n=21) (39.6%)
Age	77.3±5.6	74.2±3.1
Altered mental status	26 (81.2%)	4 (19.04%)
Nausea and vomiting	14 (43.7%)	7 (33.3%)
Diarrhea	11 (33.3%)	6 (28.5%)
Increased sweating	8 (25%)	2 (9.5%)
Increased secretions	11 (34.3%)	1 (4.7%)
Jaundice	6 (18.7%)	1 (4.7%)
Pain abdomen	5 (15.6%)	2 (9.5%)
Discharge from ed	5 (15.6%)	1 (4.7%)
Intensive care unit	12 (37.5%)	2 (9.5%)
History of substance abuse	12 (37.5%)	1 (4.7%)
Lung disease	13 (40.6%)	1 (4.7%)
Mortality	7 (21.8%)	2 (9.5%)
Intentional exposure	22 (68.7%)	15 (71.4%)
Unintentional exposure	10 (31.2%)	1 (4.7%)
Depression/insomnia	11 (34.3%)	6 (18.7%)
Respiratory distress	14 (43.7%)	3 (14.2%)
Pneumonia	12 (37.5%)	2 (9.5%)
Shock	9 (42.8%)	3 (14.2%)
Acute lung injury	6 (18.7%)	1 (4.7%)
Aspiration pneumonia	10 (31.2%)	2 (9.5%)
Hypertension	20 (61.5%)	10 (31.2%)
Diabetes mellitus	12 (37.5%)	6 (18.7%)
Chronic kidney disease	5 (15.6%)	2 (9.5%)

The most frequent causes of death among nonsurvivors were aspiration pneumonia ($n = 6$, 66.6%), shock ($n = 8$, 88.8%), and acute kidney injury ($n = 2$, 22.2%) [Table 4].

Discussion

There has been an alarming rise in cases of acute poisonings worldwide. Poison is defined as a substance, which causes metabolic disturbances by stimulating a chemical reaction. There have been very few studies in the past, describing the clinical profile, and outcome of patients with acute poisoning in the geriatric population.^[8] As per the previous studies, males dominated the profile of patients of acute poisonings, as compared with females in all the age groups.^[9] In our study also, males outnumbered females in both the younger as well as geriatric age group. The causes of poisonings vary according to the age of presentation. Intentional poisoning is the dominant cause of acute poisoning accounting for almost 53%–76% of poisoning cases in all the age groups.^[10] According to previous studies, a significant number of the geriatric patients with alleged history of poisoning had exposure to unintentional poisoning or drug toxicity.^[11] In our study, more than one-third of geriatric cases of acute poisoning had history of unintentional poisoning. Clearly cases of drug toxicity were more common in geriatric age group as compared with younger population. Exposure to alcohol intoxication, pesticides, opioids, and antidepressants were more common in younger population in our study. The older patients were more commonly exposed to toxic effects of drugs, such as oral hypoglycemic agents, antiplatelets, SSRIs, and benzodiazepines. The possible reason for the same could be that the geriatric patients are already taking these medications for multiple ailments. Accidental drug toxicity in older patients is a significant cause of unintentional drug poisoning. A similar study in past by Doak *et al.* has emphasised the increased exposure of drugs, such as tricyclic antidepressants, antiplatelet drugs, and antidiabetic drugs in older patients as compared with younger adults. This explains the difference in pattern of subscription between older and younger adults.^[12]

Table 3: Comparison of acute poisoning in younger and geriatric patients

Type of poisoning	<60 years (n=103) (67.3%)	60-70 years (n=13) (8.3%)	71-80 years (n=26) (16.6%)	>80 years (n=4) (8.9%)	P
OP poisoning	22 (21.35%)	2 (15.3%)	5 (19.2%)	1 (7.1%)	Not significant
Benzodiazepine	3 (2.9%)	2 (15.3%)	2 (7.6%)	1 (7.1%)	<0.001
OHA	0	0	1 (3.8%)	1 (7.1%)	<0.001
Alcohol	38 (36.8%)	1 (7.6%)	10	4	Not significant
Snake bite	11 (10.6%)	1 (7.6%)	10 (35.4%)	4	<0.001
Antipsychotics	13 (12.6%)	1 (7.6%)	2 (7.6%)	1 (7.1%)	<0.001
Antidepressants	3 (2.9%)	1 (7.6%)	1 (3.8%)	0	Not significant
SSRI	0	0	2 (7.6%)	1 (7.1%)	<0.001
Antiplatelets	0	0	1 (3.8%)	1 (7.1%)	<0.0001
Rat poison	4 (3.8%)	1 (7.6%)	1 (3.8%)	1 (7.1%)	Not significant
Opioid	2 (1.9%)	1 (7.6%)	0	0	<0.001
Mixture	2 (1.9%)	1 (7.6%)	0	1 (7.1%)	0.01
Scorpion bite	1 (0.9%)	1 (7.6%)	0	0	<0.001
Paracetamol	3 (2.9%)	1 (7.6%)	0	1 (7.1%)	0.045
Unknown	2 (1.9%)	0	1 (3.8%)	1 (7.1%)	Not significant

Table 4: Differences in characteristics of survivors and nonsurvivors of geriatric patients of acute poisoning (n=53)

Characteristics	Survivors (n=44) (83%)	Nonsurvivors (n=9) (16.9%)	P
Type 2 diabetes mellitus	15 (34%)	3 (33.3%)	Not significant
Hypertension	24 (54.5%)	6 (66.6%)	Not significant
Coronary artery disease	28 (63.6%)	2 (22.2%)	<0.001
Acute renal failure	6 (13.6%)	3 (33.3%)	<0.001
Pneumonia	9 (20.4%)	5 (55.5%)	0.02
ARDS (acute respiratory distress syndrome)	10 (22.7%)	6 (66.6%)	0.01
GCS (Glasgow Coma Scale)	11±4.6	7±3.9	<0.001
ED stay (h)	12±6.1	3±2.1	0.01
Hospitalization (days)	7±2.3	10±4.1	0.04
ICU stay	3±1.2	6±4.1	Not significant
Altered sensorium	26 (59.09%)	4 (44.4%)	Not significant
Increased sweating	8 (18.1%)	2 (22.2%)	Not significant
Breathlessness	6 (13.61%)	5 (55.5%)	<0.001
Increased secretions	8 (18.1%)	4 (44.4%)	0.002
Jaundice	4 (9.09%)	3 (33.3%)	<0.001
Inotropic support	10 (22.7%)	8 (88.8%)	<0.001
Ventilatory support	2 (4.5%)	7 (77.7%)	<0.001
Need for dialysis	3 (6.8%)	2 (22.2%)	<0.001

The type of toxidrome depends upon the social network of community, geography of the district, and age of presentation of the poisoning. Household products have been found to be most common cause of poisoning in India, whereas pesticides have been found to be more common in Sri Lanka and Thailand. However, in our study, alcohol intoxication followed by pesticides ingestion dominated the list of toxidromes. The possible reason for the same could be increased consumption of alcohol in both younger and older generation of the state. Also, organophosphorus is an easily available pesticide. Studies done by Dhanya *et al.* in Calicut support the above observation. Uttarakhand is primarily an agricultural state. This supports the increasing use of pesticides in the rural belt.^[4,8,9,13] More than half of the geriatric patients in our study had comorbidities, such as type 2 diabetes mellitus, hypertension, and chronic kidney disease. Around one-third of the patients in older age group had history of drug abuse in the past. Similarly, around one-third of these patients had history of depressive illness. There have been similar reports in the past which have highlighted the correlation between presence of comorbidities and psychiatric illness and suicidal attempts in geriatric patients. Thus, a thorough psychiatric assessment is advisable in these patients.^[14] Suicide attempt is a global health problem. As per survey done by Global burden of disease study in 1990, 593,000 suicidal deaths were reported in developing countries, which accounted for 75% of mortality worldwide. Thus, suicidal cases require much more medical attention especially in geriatric age group.^[15] A study done by Hawton *et al.* has reported common triggering factors of suicidal attempts in geriatric population. Around 46.1% had underlying comorbidities and physical illness, 33.5% had history of social illness, 29.4% had disputed family relationship, and 16.4% population had reported family or material loss.^[14] The drugs consumed by older patients undergo pronounced pharmacodynamic changes. This results in increased sensitivity as well as prolonged action of these drugs in these patients

especially those acting on the central nervous system.^[15] Thus, previous researchers have affirmed that 50% of dose reduction of drugs acting on the central nervous system is required in geriatric population to produce sedation. It is important to know various comorbid conditions in the elderly to decrease the incidence of drug overdose.^[16]

As per the World Health Organization, suicide is a global health problem, more common in elderly males.^[17] Various socioeconomic and demographic risk factors have been associated with suicidal attempts. These are illiteracy, history of psychiatric illness such as anxiety and depression, low self-esteem, incidence of childhood physical assault, financial and social stress, and lack of engagement in religious activities.^[18,19] De Leo has described various psychiatric risk factors such as past history of committing suicides, depressive illness, poor physical health, and feeling of being left alone, attributing to increase in number of suicidal attempts in old age.^[20] Furthermore, in 2014, Crump highlighted the role of noncommunicable ailments apart from psychiatric illnesses as robust predictors of suicidal attempts.^[21] In our study, the geriatric patients with alleged history of suicidal attempt had type 2 diabetes mellitus, hypertension, coronary artery disease, renal failure, and liver failure. Although significant risk factors contributing to mortality were coronary artery disease, renal failure, lung disorders, and liver failure. As the prevalence of these comorbidities exponentially increase with ageing, it is reasonable to predict aging as a risk factor of suicidal attempts. Erlangsen observed that chronic diseases, such as lung cancer, gastrointestinal cancer, rheumatoid arthritis, chronic obstructive airway disease, coronary artery disease, and liver disease contributed to increased risk of suicides in geriatric population.^[22] The study done by Mc Caul observed a significant association between aging and mortality due to acute poisonings.^[23] As per previous studies, lower physical activity leads to higher prevalence of chronic ailments and mood disorders.^[19] Thus, lower physical

activity and life-style disorders can be seen as probable risk factors of suicides in geriatric population. Hence, this study highlights the role of family physician who can contribute in appropriate prevention and management of life style disorders and thereby significantly decreasing the mortality and morbidity of acute poisonings in geriatric age group.

In a study conducted by Yang, the mortality rate of patients with acute poisoning of >70 years of age was around 17%. This was approximately three times as compared with those reported by other studies in younger patients.^[10,24] This was in accordance with our study. We compared various clinical and biochemical parameters between survivors and nonsurvivors. Complications such as acute renal failure, ARDS, jaundice need for inotropic, and ventilator support were significantly more common in patients who succumbed to death as compared with survivors. Similar results have been reported by Lee.^[25,26] In a study conducted by Hui-Hu, three identifiable risk factors had been predicted as precursor of mortality in geriatric patients of acute poisoning. They were herbicide poisoning, shock, and respiratory failure.^[27]

The presentation of geriatric patients with acute poisoning can be more complicated as these patients have multiple co-existing ailments. As a consequence of polypharmacy and over the counter medications, older patients are more prone to developing adverse drug reactions or unintentional poisoning. In addition, these patients are on multiple drugs. Adverse drug reactions also occur as a consequence of drug interactions among various drugs. The natural physiological changes in geriatric patients attributed to aging are responsible for altered pharmacodynamics as well as pharmacokinetics of various poisons. This can lead to detrimental complications in the older patients as compared with younger patients. Thus, it is the role of emergency physician to identify these patients timely and initiate the treatment to avoid the development of multiple complications in these patients. We would also like to highlight the role of family physicians and psychiatrists in the treatment of these patients and identification of the precipitating causes such as psychiatric illnesses, chronic ailments, and sociodemographic ailments. Thus, a holistic approach is needed to treat these patients.

Conclusion

According to our study, intentional poisoning is the most common cause of acute poisoning in all age groups. In geriatric age group, unintentional poisoning or acute drug reaction is one of the important causes of acute poisoning. Alcohol intoxication followed by organophosphorus poisoning were responsible for majority of the cases of intentional poisoning. The risk factors responsible for increased mortality in nonsurvivors were complications, such as acute renal failure, ARDS, jaundice, and need for inotropic support. Thus, a thorough understanding of profile, pattern, and complications of acute poisonings in geriatric patients can aid in improved medical care of these patients.

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Conflicts of interest

There are no conflicts of interest.

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