ORIGINAL ARTICLE

Types of Poisoning Agents Used in Patients Admitted to Medical Department of Holy Family Hospital, Rawalpindi (Pakistan) from 2011 to 2015

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Abstract

Background: The choice of poisoning agent depends on a number of factors like the geographic area, socioeconomic status, educational status and easy availability of a specific kind of poison. Thereby, the sound knowledge of the type and clinical picture of the poison is very important for its proper diagnosis and prompt treatment on emergency basis. To assess the types of poisoning agents used by patients admitted to Medical Department of Holy Family Hospital, Rawalpindi.
Methods: This is a descriptive cross-sectional study which was done on 285 patients who were admitted to Medical Department of Holy Family Hospital, Rawalpindi with history of poison ingestion from 1st January 2011 to 31st December 2015. Data was collected retrospectively and variables such as age, gender, year of reporting to hospital, residence, and type of poison were entered on a predesigned Performa. Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 23.
Results: The study showed that organophosphate compounds are the most frequent cause of poisoning (40.4%), followed by corrosives (15.8%) and wheat pill (14%). 67.7% of the population belonged to younger age group (11 to 30 years) while 52.6% of the population admitted consisted of males.
Conclusion: Organophosphate poisoning is the most frequently used poisoning type and their use is largest in the younger population. The situation can be improved by decreasing the chances of occupational exposure, addressing the reasons of self-poisoning, and improving the training of medical and paramedical staff in poisoning management at the primary, secondary and tertiary levels of hospitals.

Keywords: Epidemiology; Organophosphate; Pakistan; Poisoning

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INTRODUCTION

Poisoning is the absorption of chemical, physical or organic substances into the body by the gastrointestinal tract, skin, mucosa, respiratory tract or by injection, causing toxic effects and cell, tissue, and organ damage (1). Whether accidental, suicidal, or homicidal, poisoning forms a major bulk of the emergency department cases across the globe; however, the choice of poisoning agent depends on a number of factors like the geographic area, socioeconomic status, educational status and easy availability of a specific kind of poison. Thereby, the sound knowledge of the type and clinical picture of the poison is very important for its proper diagnosis and prompt treatment on emergency basis.

Various studies and surveys have been conducted to excavate the different aspects of poisoning in both the developing and the developed world. The statistics of the Poison Information Centre (PIC) in the United States of America show that during 2008, more than 2.4 million human exposures to poisoning were documented, of which 1315 resulted in death (fatality rate: 0.05%) (2). However, a survey done in UK interestingly revealed that although over the past ten years overall severity of poisoning in the UK has decreased but the number of poisoned patients presenting to emergency departments has increased, accounting for 5%–10% of the workload (3-5)

A review of the published medical literature depicts a similar situation in developing countries. A study performed in University Hospital, Tabriz, Iran, from 2003 to 2005, showed that poisoning accounted for 5.4% of the total hospital admissions (6). Of these admissions, 55.7% were females. Intriguingly, the poisoning cases also illustrated a seasonal trend with the peak approaching in spring and summer (6). According to the 2010 Health Bulletin of Bangladesh, acute poisoning is responsible for 2000 deaths each year (7).

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An insight into the medical text regarding the choice of poisoning agent discloses that pesticides are the poison of choice in developing countries, accounting for about 300,000 suicides each year in China and Southeast Asia (8). Amongst the pesticides, organophosphorus compound poisoning is most common. This is especially true for southern India and central Pakistan because farmers form the bulk of the population and organophosphates like parathion are easily accessible to them. Thereby, a large number of suicidal cases are encountered in this region (9). Organophosphate poisoning can also occur due to poor work practices in the workers involved in their handling of poisons. The epidemic of organophosphate poisoning which occurred due to malathion in 7500 field workers involved in Pakistan's malaria control program is the classical example of occupational poisoning (10). The Tranquilizers, narcotics and medical drugs like benzodiazepines are the second-most used choice of poisoning agent in Pakistan (11-12).

The published medical literature is grossly deficient in depicting the poisoning trends in our country, even though poisoning cases form a large fraction of emergency cases. Thus, this study aims to analyze the different features of poisoning cases in patients reporting to Holy Family Hospital, Rawalpindi as it is one of the leading tertiary care hospitals of the country.

METHODS

This is a descriptive cross-sectional study which was done on 285 patients who were admitted with a history of poison ingestion (from 1st January 2011 to 31st December 2015) to Medical Department of Holy Family Hospital, Rawalpindi.

Rawalpindi division contains the districts of Attock, Chakwal, Jhelum, and Rawalpindi. Its area is 22, 254 km² and its population is 6,659,528. Rawalpindi city is located next to the capital Islamabad. It has 4 teaching hospitals, 4 THQ (Tehseel headquarter) hospitals, 10 RHCs (Rural health centers) and 98 BHUs (Basic health units). Holy family hospital, established in 1948, is an 850 bedded hospital and has departments of Medicine, Surgery, Eye, ENT, Pediatrics, Gynecology and Obstetrics.

Poisoning was defined as the ingestion of a poison or excessive dose of a medicine, either intentionally or unintentionally. Data was collected retrospectively and variables like age, gender, year of reporting to hospital, residence and type of poison were entered on a predesigned Performa. All of the patients who were admitted with history of poisoning were included in the study (285) and the 30 patients with missing/incomplete data were excluded from the study, signifying that 9.5% of samples went missing and that the study was conducted on 285 patients (90.5%).

Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 23. Descriptive statistics were used to measure qualitative and quantitative variables. Frequencies and percentages were calculated for age, gender, residence, year of reporting to hospital and type of poisoning agent used. Cross-tabulation was performed to find the relationship of type of poison with age, gender, residence and year of poisoning.

Table 1. Sociodemographic Features of Study Population

Variable	Gender-Wise Distribution		Total
AGE (years)	Male	Female	Frequency (%age)
11 to 20	42 (28%)	68 (50.3%)	110 (38.6%)
21 to 30	49 (32.6%)	34 (25.1%)	83 (29.1%)
31 to 40	25 (16.6%)	18 (13.3%)	43 (15.1%)
41 to 50	7 (4.6%)	7 (5.1%)	14 (4.9%)
51 to 60	10 (6.6%)	4 (2.9%)	14 (4.9%)
61 to 70	17 (11.3%)	4 (2.9%)	21 (7.4%)
RESIDENCE	Male	Female	Frequency (%age)
Rawalpindi	88 (58.6%)	83 (61.4%)	171 (60%)
Chakwal	17 (11.3%)	16 (11.8%)	33 (11.6%)
Attock	24 (16%)	16 (11.8%)	40 (14%)
Abbottabad	7 (4.7%	8 (5.9%)	15 (5.3%)
Azad Jammu Kashmir	7 (4.7%)	7 (5.1%)	14 (4.9%)
Murree	7 (4.7%)	5 (3.7%)	12 (4.2%)
Year Of Reporting To Hospital For Poisoning	Male	Female	Frequency (%age)
2011	8 (5.3%)	9 (6.7%)	17 (5.9%)
2012	12 (8%)	10 (7.4%)	22 (7.7%)
2013	26 (17.3%)	36 (26.7%)	62 (21.7%)
2014	46 (30.7%)	33 (24.4%)	79 (27.7%)
2015	58 (38.7%)	47 (34.8%)	105 (36.8%)

RESULTS

In this study, 285 patients were included, of which, 150 were males and 135 were females. Young population (11 to 20 years old) was the most affected (38.6%). Interestingly, females represented the majority of poisoning cases compared to males in the age stratum 11-20 years, i.e. 50.3% of females and 28% of males respectively. In all the other strata, males were more involved in poisoning than females. Rawalpindi District contributed the largest number of poisoning cases (60%) and gender bifurcation depicted predominant involvement of males in all districts. The results also depicted a consistent rise in the number of poisoning cases from 2011 (6%) to 2015 (37.1%) (As shown in Table 1). Organophosphate compounds (40.4%) were found to be the most frequent poisoning agents followed by corrosives (15.8%), wheat pills (14%), Non-steroidal anti-inflammatory drugs (13.7%), opioids (11.6%) and methanol (4.6%) respectively. Upon cross tabulation, organophosphate compounds came up as the poisoning agents of choice in young patients (11 to 40), while in older populations (50 to 70 years) the trend shifted towards opioids and NSAIDs. Furthermore, an evaluation of the gender preference for poisoning agent delineated that organophosphate compounds were the most commonly used poisoning agents in both genders. However, the second choice shifted towards NSAIDs in males and corrosives in females. The p-values came out to be significant for age ($P < 0.001$) and gender ($P < 0.001$) and insignificant for year of poisoning ($P < 0.232$) and residence ($P < 0.174$) (Table 2).

DISCUSSION

During the last decade, the world has experienced a dramatic rise in substance abuse, drug abuse and use of various types of poisoning agents. The trend reciprocated in both the developed and developing countries like Pakistan. The current study which aimed at assessing the various types of poisoning agents used identified organophosphate compounds

Table 2. Relationship of type of poisoning with age, gender, residence, and year of poisoning

VARIABLE	TYPE OF POISONING AGENT						p-value
AGE	Organophosphate Compounds	Corrosive intake	Wheat pill	NSAIDs overdose	opioids	methanol	
11 to 20 yrs	49 (42.6%)	21 (46.7%)	21 (52.5%)	9 (23.1%)	7 (21.2%)	3 (23.1%)	
21 to 30 yrs	34 (29.6%)	15 (33.3%)	12 (30%)	6 (15.4%)	11 (33.3%)	5 (38.5%)	
31 to 40 yrs	18 (15.7%)	4 (8.9%)	5 (12.5%)	8 (20.5%)	5 (15.2%)	3 (23.1%)	P < 0.001
41 to 50 yrs	4 (3.5%)	3 (6.7%)	1 (2.5%)	2 (5.1%)	2 (6.1%)	2 (15.4%)	
51 to 60 yrs	4 (3.5%)	2 (4.4%)	0	2 (5.1%)	6 (18.2%)	0	
61 to 70 yrs	6 (5.2%)	0	1 (2.5%)	12 (30.8%)	2 (6.1%)	0	
Total	115 (100%)	45 (100%)	40 (100%)	39 (100%)	33 (100%)	13 (100%)	
GENDER							
Males	53 (46.1%)	16 (35.6%)	19 (47.5%)	27 (69.2%)	23 (69.7%)	12 (92.3%)	P < 0.001
Females	62 (53.9%)	29 (64.4%)	21 (52.5%)	12 (30.8%)	10 (30.3%)	1 (7.7%)	
Total	115 (100%)	45 (100%)	40 (100%)	39 (100%)	33 (100%)	13 (100%)	
YEAR OF POISONING							
2011	9 (7.8%)	1 (2.2%)	1 (2.5%)	4 (10.3%)	2 (6.1%)	0	
2012	10 (8.7%)	1 (2.2%)	4 (10%)	2 (5.1%)	4 (12.1%)	1 (7.7%)	
2013	16 (13.9%)	18 (40%)	7 (17.5%)	7 (17.9%)	8 (24.2%)	6 (46.2%)	P < 0.232
2014	34 (29.6%)	12 (26.7%)	9 (22.5%)	9 (23.1%)	11 (33.3%)	3 (23.1%)	
2015	46 (39%)	13 (28.9%)	19 (47.5%)	17 (43.6%)	8 (24.2%)	3 (23.1%)	
Total	115 (100%)	45 (100%)	40 (100%)	39 (100%)	33 (100%)	13 (100%)	
RESIDENCE							
Rawalpindi	65 (56.5%)	27 (60%)	23 (57.5%)	25 (64.1%)	25 (75.8%)	6 (46.2%)	
Chakwal	16 (13.9%)	3 (6.7%)	7 (17.5%)	5 (12.8%)	1 (3%)	1 (7.7%)	
Attock	15 (13%)	7 (15.6%)	8 (20%)	6 (15.4%)	3 (9.1%	1 (7.7%)	
Abbottabad	6 (5.2%)	4 (8.9%)	1 (2.5%)	2 (5.1%)	1 (3%)	1 (7.7%)	P < 0.174
Azad Jammu Kashmir	7 (6.1%)	4 (8.9%)	1 (2.5%)	0	1 (3%)	1 (7.7%)	
Murree	6 (5.2%)	0	0	1 (2.6%)	2 (6.1%)	3 (23.1%)	
Total	115 (100%)	45(100%)	4(100%)	39(100%)	33(100%)	13(100%)	

as the most frequently used poison (40.4%) in both genders and also in the young population. This heavy number of poisonings in the young population may be due to widespread reasons like impulsive behavior, failure in love, peer pressure, broken families, professional dissatisfaction, etc., which precipitates the chances of self-poisoning in these cases. A study conducted on the laboratory samples of poisoning cases of 13 districts of KPK revealed that organophosphate compounds were the second most frequently used poisoning agent in males and the poison of choice in females (13). Another study conducted on a tertiary care hospital in Belagavi, India reciprocated similar results and depicted that organophosphate compounds took the lead and were responsible for 71.8% of the poisoning cases, and that the population most effected was the young population i.e. 11 to 40 years (14). This predominance of organophosphates as the poisoning agents can be explained by the easy availability of organophosphate compounds in rural homes as they are widely used in agriculture. One of the most crucial finding was in the age group/ gender category. Twenty-eight (28%) of the total male poisoning cases were in the 11-20 (years) age group whereas 50% of the total females were in the same age group. This discrepancy can be explained on the basis that many young women in our rural areas specifically are subject to mental torture due to their staying at home and lack of education, along with the tradition of forced young age marriages in rural populations.

Our study documented corrosive agents (15.8%) as the second most frequently used poisoning agent overall. However, young females (11 to 30 years) showed more inclination towards their use. This is in coherence with another study conducted at an allied hospital of Rawalpindi Medical College, which revealed that corrosives caused 17.9% of poisoning cases (15). However, it is in contrast to the studies conducted at tertiary care hospitals of Bangladesh and India which outlined that the percentage of corrosive poisoning is 2.9% and 3% respectively (16, 17). This wide gap can be explained by the effortless accessibility to corrosives, as they are used in various household activities like cleaning etc. in our country. Females show preeminence for their use because they are the ones who are chiefly involved in household chores.

Drugs like NSAIDs and opioids generated 13.7% and 11.6% poisoning cases, respectively. Additionally, their usage was more prevalent in males and in older populations (50 to 70 years). A report issued in 2014 by the American Association of Poison Control Centers (NPDS) contradicted our study, claiming that drugs, such as analgesics, sedatives, antidepressants, and CVS drugs, form the bulk of all the poisoning cases reported with the use of organophosphates at just 3.5% (18). This difference can be attributed to disparate cultural norms, contrasting availability of poisoning agents and dissimilar literacy levels of the study population in the two studies. Their dominance in the old population can be justified by the widespread use of these drugs in older populations as compared to younger populations and higher chances of accidental overdose, and adverse reactions in geriatric population.

Methanol/Alcohol was the least frequent poison used in our study, and males showed a clear preference for its use. This is in complete divergence with a study conducted in China which delineated alcohol as the leading poisoning agent (54.5%) (19). However, it was consistent with our study in that it also depicted a male preference for alcohol use. (65.4% males) This disparity can be attributed to the religious binding on the use of alcohol which greatly decreases its contribution as a poisoning agent in our society. Male inclination to alcohol use can be ascribed to their tendency to indulge more in negative habits of a progressive society.

This study can prove to be of profound value, not only in the diagnosis and management of the poisoning cases, but also in devising regulations that can restrict the availability of easily accessible poisoning agents.

LIMITATIONS

The central limitation of this research is the confined geographical area from which data was collected, as this might restrict the extent to which results can be generalized to the rest of the population.

CONCLUSION

Our study concluded that organophosphate compounds are the most frequently used poisoning agents in patients reporting to Medical Units of Holy Family Hospital, Rawalpindi and the most predominantly effected population was of young males. This study can serve as a launching pad for many more studies which should be done in a prospective manner to probe into the matter. However, it is a retrospective study which failed to analyze many aspects of the situation including reason of poisoning.

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