Incidence of Fatal Poisoning in the City of Lahore. A Retrospective Study During 1984-1988.

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Death from poisoning is becoming common in Pakistan. Different causative factors are working for this emerging problem. A retrospective study (1984-88) was carried out to find various trends in fatal poisoning and correlate the findings with a variety of factors responsible for its occurrence. It was found that death due to poisoning was more in males (81.66%) as compared to females (18.33%) between 20 to 30 years. Suicidal poisoning was present in 35% of the total cases with barbiturate ingestion (2: 3). Death due to accidental poisoning (26.66%) was seen with Insecticides [Organophosphates and Chlorinated Hydrocarbons] (1:1.6). Accidental overdosage (30.00 %) was found to be fatal with opium alkaloids i.e heroin (1:1). We conclude, therefore, that more elaborate studies are required in this area of recent research to identify different causative agents resulting in deaths due to poisoning. It will help to adopt appropriate and adequate measures to save precious lives.
Key words: Intentional: Suicidal, Homicidal. Unintentional: Accidental. Unintentional drug overdosage: Death with drug abuse.

Acquaintance of poison with man is prehistoric. Toxic agents have been used for suicidal and homicidal intentions since time immemorial[1]. For political execution they were used as state poisons[2]. Pattern of poisoning is dependent upon a variety of factors e.g ease of access, properties, dose and route of exposure to a particular poison[3]. Addiction to a narcotic agent and presence of disease enhances toxicity. Several interacting phenomena are also responsible like synergism, automatism, tolerance[4]. Accidental and deliberate ingestions are the common modes of poisoning specially with insecticides[5,6]. During the past four decades some 15,000 individual compounds and more than 3,500 different formulations have come into use as pesticides. The number of deaths globally from pesticide poisoning has been estimated to about 80,000 per year, using a fatality rate of 0.5% for the developing countries and 0.25% for the developed countries[7]. Barbiturates had been a major cause of self-poisoning in 1960[8]. Roy A[9] found that in majority of suicides, death have been due to over dosage of barbiturates. Phenobarbitone is still widely used for the prevention of major epileptiform attacks[8].Although some drug of abuse may affect higher nervous functions i.e mood, reaction time and coordination, they may produce physical effects with fatal overdoses[10]. Majority of cases of opiod poisoning are a consequence of drug abuse[8]. Alcohol dependence affects mainly10% of population and results in considerable morbidity and mortality[11]. It was found that 78% of trespassers were killed while intoxicated[12].

There is a remarkable dearth of statistics about the current trends of fatal poisoning leading in turn to inadequate management of poisoning cases. There is also scarcity of prevention programmes/policies to out root this grave problem. A retrospective study is therefore carried out to find out various trends in fatal poisoning and to correlate the findings with the causative agent.

Material and Methods

Out of 4,149 autopsies conducted at the Department of Forensic Medicine & Toxicology, K.E.Medical College, Lahore during 1984-88, sixty cases of suspected poisoning were reported. They were brought by police from different areas of Lahore. The autopsy certificates, police inquest reports along with reports of the Chemical Examiner were scrutinized in detail.

Statistical Analysis

The results are expressed as Mean±SD and percentage (%). P value is calculated by Z (%) test.

$$Z\,(\%) = \frac{P_1 - P_2}{\sqrt{P_1 \times \frac{100-P_1}{n_1} + P_2 \times \frac{100-P_2}{n_2}}}$$

Table. 1.Sex distribution of poisoning cases.

Sex	No. of Cases	%age
Male	49	81.66
Female	11	18.33
Total	60	100

Table 2. Distribution of poisoning cases according to age.

Age (years)	No. of cases	%age
< 10	00	00
10-20	12	20.00
20-30	22	36.66
30-40	18	30.00
40-50	04	06.66
50-60	02	03.33
60-70	01	01.66
> 70	01	01.66
Total	60	100

Table 3. Distribution of poisoning cases/year (1984-1988).

Year	Number of Cases	%age
1984	11	18.33
1985	20	33.33
1986	09	15.00
1987	17	28.33
1988	03	05.00
5 years	60	100

Table 4 Total number of autopsies and reported cases of poisoning / year (1984-1988)

Year (1984-88)	Total No. of autopsies	Poisoning cases	%age
1984	739	11	1.48
1985	839	20	2.23
1986	1020	9	0.88
1987	788	17	2.15
1988	709	3	0.49
Total	4149	60	1.44

Table 5 Manner of death in poisoning cases.

n=	Manner of Death			
	Suicidal	Accidental/Over Dosage	Accidental	Homicidal
60	21(35%)	18((30%)	16(26.66%)	5(8.33%)

Table.6. Relationship between a toxic agent and manner of death in poisoning cases

Toxic Agent	Manner Death				Total (60)	%age (100)
	S (21)	A (16)	H (5)	AO (17)		
Insecticide	5	8	-	-	13	21.66
Tranquilizer	3	3	-	5	11	18.33
Barbiturates	6	-	3	-	9	15
Heroin	-	-	-	5	5	
Opium	-	-	-	4	4	15
Cyanide	3	2	1	-	6	10
Corrosives	1	2	1	-	4	6.66
Alcohol	-	-	-	2	2	3.33
Carbon monoxide	-	1	-	-	1	1.66
Copper suophate	1	-	-	-	1	1.66
>one poison	2	-	-	2	4	6.66

S=Suicidal
A=Accidental
H=Homicidal
AO=Addiction Overdosae

Table 7. Ratio between the manner of death and poison used in total cases

Manner of death (n_1)	Total cases of which poison was used (n_2)	Ratio n_1=n_2
Suicidal (n1=6)	Barbiturates (n_2=9)	2:3
Accidental (n1=8)	Insecticides (n_2=13)	1:1.6
Homicidal (n=3)	Barbiturates (n_2=9)	1:3
Accidental over dosage (drug abuse) n_1=5	Heroin (n_2=5)	1:1

Table 8. Cases in which more than one poison was used (n = 04)

Group	Manner of death	Toxic agents
A	Suicidal(2)	Acid barbiturate+ Diazepam,
B	Homicidal(2)	Acid barbiturate+ Tranquillizer Chlorpromazine+ Morphine Heroin+Valium

Table 9. Cases of poisoning associated with trauma

Poison	Trauma/asphyxial death	Manner of death	n=
Acid barbiturate	Antemortem hanging	Homicidal	2
Vitriolage H_2SO_4	Wound on face	Homicidal	1
HCN	2 abrasions left & right toe	Homicidal	1
Opium	Drowning	Accidental overdosage	2
Morphine	Simple injuries	Accidental overdosage	1
Alcohol	Extensive superficial blunt trauma	Accidental overdoasge	1

Results and Observations

Over a period of five years (1984-88), a total of 60 poisoning cases were brought by police for autopsy. It was found that death due to poisoning was predominant in males i.e 81.66% (Table 1). Mean age of the victims was 30.28±10.38 years. 36.66 % were between the ranges of 20-30 years (Table 2). Maximum number of poisoning cases were reported during 1985 i.e 33.33% (Table 3, 4). Manner of death was found to be suicidal (35%), accidental (26.66%) and homicidal (8.33%). Accidental overdosage occurred in 30.00% cases (Table-5). Different groups of chemical agents and alkaloids were used as a toxic agent. Acid Barbiturate compound was found to be the principal toxic agent in suicidal cases (2:3). Death due to accidental poisoning was mainly by insecticides (both organophosphates and chlorinated hydrocarbons) (1:6) (Table 6, 7). In four cases more than one toxic agent were detected in the biological specimens (Table 8). Trauma and asphyxial deaths were associated with homicidal poisoning and accidental overdosage (Table 9).

Discussion

Death from poisoning can be the outcome of different motives i.e suicide, homicide. It can be accidental or fatal

over dosage as seen in drug addicts. Data summarized by us revealed a rising trend of fatal poisoning in males (81.66%) amongst the young adults (36.66%) between 20-30 years. Adult deaths are reported as accidental and deliberate pesticide poisoning in developing countries[13]. In general, the suicidal trend found to be higher in males than in females[9] . We attribute fatal poisoning in young adults to various factors like socioeconomic depression, failure to cope with day-to-day challenges, stressful events like bereavement, unemployment etc. However in contrast, it was observed that in 1961 to 1963, women between 45 and 64 years had the highest rate of suicide, whereas with men the peaks were at 55 and over. It may be conjectured that the peaks occur at an age when men and women relinquish the principal domestic or occupational roles that society confers on each and they reappraise their purposes of life[9] . In our study, the common route of exposure to poison was ingestion. This finding is supported by many studies[5,13,14]. It was reported that ingestion accounted 75% exposure rate followed in frequency by dermal, inhalation, ocular, and aspiration exposure[13]. In a recent study it was shown that 16.7% of suicide cases were of fatal poisoning due to ingestion[5], whereas in UK 90% episodes of deliberate self-harm were due to ingestion of harmful substances[14].

Present study revealed barbiturates, as the poison of choice for suicide in males, next in order were insecticides and cyanides. These results are supported by earlier findings where barbiturates were the major cause of self-poisoning. A figure of 838 in 1960 rising to 2,056 in 1966 was found[8]. Roy A also found that majority of suicides dying from over dosage has taken barbiturates. It was observed in the same study that males prefer violent deaths and females adhere to passive deaths[9]. Availability determines the means chosen for committing suicide e.g firearms are most commonly used methods in gun carrying nations, carbon monoxide is most often used in coal producing nations, drowning is frequently favoured in the watery Netherlands[9] but circumstances do affect the preferences. A recent study revealed 16.7% suicidal ingestions with female preponderance (62.5%)[5]. These results are inconsistent with our findings i.e 35% suicidal ingestions with male predominance (81.66%). It showed a significantly high incidence of suicidal poisoning during five years (1984-88). p value, 0.05. A shift to more violent deaths e.g hanging, firearms, self- immolation seems to be likely the reasons for this declining trend.

Unintentional drug overdosage was found to be predominant with substances like tranquillizers (27.77%), heroin (27.77%), opium (22.22%), alcohol (11.11%) and multidrug abuse (11.11%) resulting in death. These findings are supported by a study in which the leading causes of unintentional poisoning were opiates and related narcotics, alcohol ingestion, cocaine and local anesthetics[13]. Contrary to this, in 1988 it was found that analgesics (10.5%), cleaning substances (10.0%), cosmetics (8.1%) and plants (6.9%)were the most frequent cause of poisoning[13].

Present study showed two cases of alcohol intoxication with fatal outcome supported by the finding that alcohol dependence affects mainly 10% of population and results in considerable morbidity and mortality[11], in addition it was also shown that 78% of trespassers were killed while intoxicated..

Insecticides were the most frequent cause of accidental poisoning (50%)in the present study. This finding is supported by many workers[6,7,13]. Accidental poisoning with insecticides cause much illness and loss of life every year[7]. It has been estimated that three million cases of acute pesticide poisoning occur each year in developed countries[13]. In Pakistan insecticidal poisoning with suicidal intent is common because of its easy availability in every[6] house. We relate the existing trend to an easy access to these compounds and also to their higher toxicity towards human beings.

Fatalities also result from ingestion with multiple toxic agents. Present study revealed such finding in four cases, indicating an important factor complicating the diagnosis, management and analysis of biological specimens. Data from other research workers also point towards multidrug abuse resulting in death[10]. A further complication of toxicological significance is that these are synthesized in illegal, inadequately equipped laboratories, resultant products are therefore often contaminated with compounds of unknown, but conceivably dangerous toxicity[4,10].

Homicidal poisoning was associated with trauma (2 cases) i.e, ante mortem hanging. A finding, which needs to be explored. We came across only one case of carbon monoxide poisoning. The incidence has fallen sharply nearly everywhere depending on the changing circumstances. In England and Wales in 1960,carbon monoxide poisoning accounted for nearly 50% of all suicides. With the introduction of natural gas a steep decline in the suicide rate occurred[9]. In the present study it was found that although the predominant groups of poisons were barbiturates, opium with related alkaloids and insecticides but death occurred with copper sulphate, cyanides and corrosives also. Data record of such poisoning was not found thus inviting more scientific studies on such incidence.

Present study draws attention towards different prevailing patterns of poisoning. Easy availability of insecticides and their indiscriminate use is responsible for accidental and suicidal deaths. Methods should be adopted for safe use of pesticides, more importantly safety to human health and environment must be ensured before their marketing. Deliberate ingestion with barbiturates, tranquillizers and accidental over dosage with opium alkaloids and tranquillizers, predominantly in males at 30.28±10.38 years is alarming. Further work is therefore necessary to evaluate the causative agents and to find out recent trends in fatalities due to poisoning. Moreover, accidental and suicidal deaths should not be considered as inevitable. Exploring effective and adequate measures can

prevent them.

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