

**DRUG POISONING TREND IN CHILDREN AND ADOLESCENTS**

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ABSTRACT

Objective: Quantify burden of drug poisoning and its trend in less than 18 years. *Design:* Retrospective observation study. *Methods:* All the children admitted with diagnosis of acute drug poisoning between January 2013 and June 2015 was studied. *Results:* There were 48 cases of drug poisoning accounting for 14.5% of all poisoning admissions, peaking in rainy season and in adolescence with female: male ratio of 18:1 after 14 years of age. Anti epileptic drugs and benzodiazepines were the most common drugs with 27 out of 48 cases followed by iron poisoning with 7 cases. No drug belonging to narcotics and psychodysleptics, drugs acting on central nervous system was observed in our study. Drug poisoning peaked during rainy season. *Conclusions:* 14.5% of acute poisoning in children and adolescents is due to drug poisoning with peak during adolescence and rainy season. Anti epileptics and benzodiazepines were most commonly used drugs. Adolescent females were involved in drug poisoning in alarming proportions.

Key words: Drug poisoning in children, adolescent drug poisoning, medicinal poisoning, poisoning trend

INTRODUCTION

Poisoning continues to be an important paediatric emergency. ^[1] Iron is among the leading causes of accidental poisoning in USA, especially among pre-school children. ^[2, 3] High doses of analgesics, tranquillizers, and antidepressants are the commonly used agents for intentional poisoning in industrialized countries. Medicines were responsible for 44.9% , 25% , 66.6% , 11% , 26.1% of all causes poisoning in different studies. ^[4, 5, 6, 7, 8] Although drug related poisoning contributes significantly to paediatric admissions, there is little published data with respect to medicinal poisoning in children from India and majority of studies have been largely reported from metropolitan and few major cities of India. Hence, this study was undertaken to quantify burden of drug poisoning and its trend in less than 18 years.

MATERIALS AND METHODS

This is retrospective observation study of all the children below the age of 18 years admitted with diagnosis of acute drug poisoning to Vanivilas

women and children's hospital, tertiary health care centre under Bangalore Medical College and Research Institute, Bengaluru. Data was collected for the period from 1.1.2013 to 30.6.2015 using medico legal registry, in patient records, daily duty reports. Forensic reports of gastric aspirates and post-mortem findings were not analyzed. Specially designed data collection performa was used for getting information on demographic profile, name, quantity nature of poison, route of exposure, information regarding first aid received else, signs and symptoms, investigations done, treatment given, complications, treatment outcomes and events of mortality and the reasons for the mortality.

RESULTS

Incidence and types of drug poisoning: Forty eight of 332 admissions between January 2013 to June 2015 with diagnosis of acute poisoning were found to be acute drug poisoning. Antiepileptic drugs (AED) and benzodiazepines (BDZ) were most frequently used drugs with 27 out of 48 cases followed by iron

poisoning with 7 cases (**Figure 1**). Non opioid analgesics were seen in 3, antihistaminics in 2, antitubercular drugs in 3, tricyclic antidepressants (TCA) in 4, antipsychotics in 2, thyroxine in 2 and multiple drugs in 3. None of the AED, BDZ and psychotropic drugs was seen in infancy. AED and BDZ poisoning increased with age. Multiple drug consumption was observed in 3, all during adolescence. None of the drugs poisoning belonging to class narcotics and psychodysleptics, drugs acting on central nervous system was observed in our study (**Figure 2**).

Drug poisoning and age: No case drug poisoning was observed during infancy in our study. Increase in drug poisoning during 1-4 years and after 10 years with highest number observed after 14 years. Thirty one of 48 cases were observed between 10 and 18 years. (**Figure 3**). AED and BDZ poisoning increased with age (**Figure 2**). AED and BDZ were the most implicated class during adolescence with 19 of 31 patients consuming these classes of drugs. Adolescents mostly preferred consuming AED, BDZ, multiple drugs and hormones. Anti histaminics poisoning in our study was observed in 1-4 year age group and 2 thyroxine poisoning in 14 years and older. Iron poisoning was observed uniformly in all age groups after infancy. Interestingly, analgesics were encountered in 3 cases with all older than 10 years. Gender variation was observed with females outnumbering the males. Male:Female ratio was highest after 14 years of age with 1: 18.

Seasonal variation: We have observed maximum number of drug poisoning during between may and august (**Figure 4 and Figure 5**). These values were derived by combining the number of drug poisoning in different months of two years, i.e., 2013 and 2014. Drug poisonings that occurred during 2015 were not included to derive seasonal variation to avoid bias.

DISCUSSION

Incidence: 18 years and younger ones are the second most frequently affected group after 21-35 years group in poisoning.^[9] Medicines are contributing significantly to acute poisoning. Our single centre experience is that medicines were responsible for 14.5% of all acute poisoning, figure in lower range than reported 44.9%, 25%, 66.6%, 11%, 26.1% and 21%.^[4,5,6,7,8,10] Study at All India Institute of Medical Sciences showed drug poisoning at 18% of acute poisoning and as being most common cause.

Age affected: Our observations that rates of drug poisoning increased with age with slight dip in 5-9 years (**figure 3**) and is almost consistent with other studies.^[11] None of the children with drug poisoning in our study was below one year in contrast to reported 7% in below 6 months, 9% and 14.6% in infancy.^[4,6,12] Slight increase between 1-4 years could be explained by exploratory behaviour of children in this age. Poisoning in this age was due to accidental consumption in all cases of our study. Thirty one of all 48 medicinal poisoning was after 10 years in our study. 11.0% of 136 acute poisoning of all causes were reported to be drugs and chemicals in people above 12 years in one observation.^[7]

15-20 years age is second most prone age to all poisoning deaths.^[13] 12 to 19-year age group contributes for 30.2% of all poisoning,⁷ and drugs account for 25% and 11.0%.^{5,7} Adverse drug reactions contributed for nearly 4.6% of all drug reactions in the age less than 19 years of age.^[14] In 12-18 years, medicinal drugs account for 84.5% and non medicinal compounds for 10.5% in one study.^[15]

Gender: Our study had female predominance in contrast to some reports. In one study involving 12 to 18 years self poisoners, female/male ratio was 8:1.^[15] Slightly more male predominance (51.7%) was observed by some where as females outnumbered males in other studies.^[5,11,16,17] Male sex correlate positively with poisoning.^[18]

Types of drug poisoning: Our study reveals medicines are responsible for 14.5% of all poisoning although not a most common cause of poisoning in children in contrast to one study in Delhi.^[6] However, BDZ and AED topped the list in our study where as BDZ followed by analgesics topped the list in one north Indian study. Iron poisoning was more frequently observed in our study than Delhi study.^[6] Iron poisoning was observed in all ages in study, contrary to reported increased incidence in younger age. Iron poisoning was seen in younger children. Anti thyroid drugs and anti histaminics accounted for 4% each of medicinal poisoning and 0.6% of all cause poisoning, in concurrence with other observations (1.37%).^[14] Paracetamol was the most common (14.2%) of all causes poisonings in some studies.^[5,15] Only 3 of 48 (6.25%) patients in our study used multiple drugs against reported 18% and 3.8%.^[6,9] BDZ were seen in 1.1%- 33.33%, analgesics in 1.1% -7.89%, antidepressants in 1.94%-8.4%, barbiturates in 5.70%, unknown drug in 12.3%, multiple drugs in 2.8-18%, antihistaminics in 0.4%-3.07%, antidiabetics in

2.19%, iron in 1.75%-2.7%, anti thyroid in 1.37% in various studies.^[4, 5, 6, 9, 10]

Opiates represented 6.6%-11.9% of poisoning in children in different studies.^[4,10] Opioids were the most common agents below 6 months old.^[4] Opioids were not encountered in our study in contrast to study from Pakistan where in it is used as traditional healer for infantile colic and sedation.^[4] 38.1% of intentional drug abuses between 6-19 years were non prescription drugs(NPD) such as those with anti cholinergic properties, caffeine, dextro methorphan, and non prescription stimulants in one report.^[16] Medicinal poisoning are frequently seen in metropolitan city like Delhi than Bengaluru as in our case. Prevalence of anti depressants and BDZ poisoning in our study is comparable with the Kermanshah study.^[19] BDZ was observed only in 2.3%.^[9] In Tehran study, BDZ and antidepressants were the most common drug poisoning.^[20] Paracetamol followed by BDZ, and TCA were the most frequently used drugs in Nepal.^[5] In some studies done in Saudi Arabia, Ankara and Emirates, analgesics and anti inflammatory drugs were the common causes of poisoning.^[21,22,23] Phenobarbitone, diazepam, alprazolam, cough syrups, mixture of tablets/capsules and pharmaceutical agents were prevalent in various other publications.^[7, 24, 25] BDZ were most commonly involved drugs (33.3%), followed by analgesics (7.89%) and multi drugs (18%) in different studies although majority of patients were above 18 years.^[6,8] In contrast, our study population was below 18 years and we did not observe anti diabetic drugs, anti asthmatics during our study period. More ever, we could trace the type of drugs used in all cases. The substances were most frequently implicated (25.64%) after insecticides (37.61%) in one study.^[26] The circumstances of poisoning were intentional (75%) and accidental (20%); most of the childhood poisonings were accidental in nature.^[5] 23% non-prescription drugs, 19% prescription drugs in one study.^[11]

Seasonal variation: We have observed maximum number of drug poisoning between may and august in contrast to all causes during summer and rainy season(**figure 4 and 5.**) Similar observations, but of all causes have been reported in other studies^[18,27,28] one south Indian study reported maximum number of all causes poisoning occurred during summer and rainy season.^[8] To the best of our knowledge, ours is the first study to make a note of seasonal variation of drug poisoning. This trend needs to be clarified from other studies. Peak of all causes poisoning was observed in rainy season although seasonal incidence with respect to drugs

were not mentioned.^[5] Seasonal variation in poisoning was observed with more cases in the summer months.^[5]

Geographical variation: In some studies done in Saudi Arabia, Ankara and Emirates, analgesics and anti inflammatory drugs were the common causes of poisoning.^[21,22,23] Phenothiazines dominated the drug poisoning in Jammu and Kashmir, although it was done in nineties.^[12] However, BDZ and AED topped the list in our study where as BDZ followed by analgesics topped the list in one north Indian study. BDZ were observed only in 2.3%, cetirizine in 0.4%, multiple tablets in 3.8%, pain killers in 0.8% of 261 patients in one study from south Indian city.^[9]

Changing poisoning type with time: Most of the admissions in nineties were due to side effects especially during infancy.^[12] This is very much evident in one retrospective study of 670 children less than 12 years from 1983 to 1988, phenothiazines were the cause in 30% poisoning and were observed in 92,38,38,32 cases in infancy,1-4 yr,5-8yr,and 9-12 yr respectively.Phenothiazines, other drugs and chemicals combined were responsible for 53% of all poisoning. Drugs were advised either by qualified doctors or paediatricians IN 80% cases and was due to practioner's negligence in 26% cases.^[12] Medicinal compounds poisoning has decreased from 28% in 1977-79 to 23% in 1989-1993.^[10] Opioid poisoning were seen maximally in infancy, anti depressants and anti convulsants after infancy.^[10] We have more of AED and BDZ in our study.

Suicide versus homicide: In our study,females dominated the drug poisoning. All the drug poisoning after 14 years were because of suicidal attempts in our study. All the drug poisoning in less than 9 years were accidental in nature in our study. In suicide attempt group, 80% of cases were females and all cases were over 10 years old and this was compatible with other studies.^[4, 22] Poisoning was intentional in 75% and accidental in 20%; most of the childhood poisonings were accidental in nature in one report.^[5]

Mortality: No child died due to poisoning in our case study. Zero-1.8% mortality has been observed in medicinal poisoning in different studies.^[4, 12, 29] Because of the bad tastes of majority of poisonous substances, children don't ingest large amount of them and on- time and effective management can prevent mortality.^[29]

Limitations of the study: This is single centre retrospective study in tertiary care centre. Randomised control trials to know significance of each variable and meta analysis of contemporary

literature involving different regions of the country is needed to help take effective steps in reducing the incidence of child hood poisoning.

CONCLUSIONS

AED, BDZ were most common medicinal poisonings. Iron poisoning was observed in all age groups. No narcotics and psychodysleptics, drugs acting on central nervous system was observed in our study. Medicinal poisoning increased with age peaking in adolescence. Medicinal poisoning was

most common during rainy season. Adolescent females were worst affected group. Intentional medicinal use was common after 10 years. Type of drug used for poisoning is different in different times and different geographical locations. Further studies are needed to assess significance of each variable contributing for acute drug poisoning in age less than 18 years.

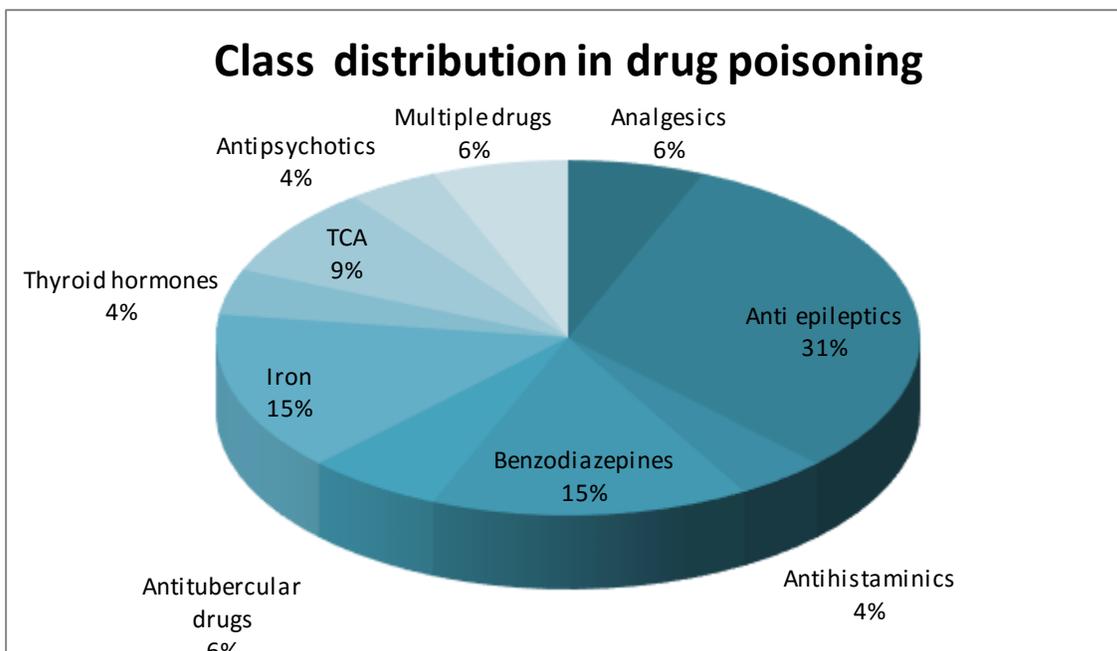


Figure 1: Age wise distribution of different classes of drugs in acute poisoning

Class of drugs.	<1yr	1-4 yr	5-9 yr	10-14 yr	>14 yr
Nonopioid analgesics, antipyretics, and antirheumatics	0	0	0	1	2
antiepileptic, sedative-hypnotic, and psychotropic	0	1	7	9	10
narcotics and psychodysleptics, not elsewhere classified	0	0	0	0	0
drugs acting on the autonomic nervous system	0	0	0	0	0

Figure 2 : Table showing Age wise distribution of different classes of drugs in acute poisoning

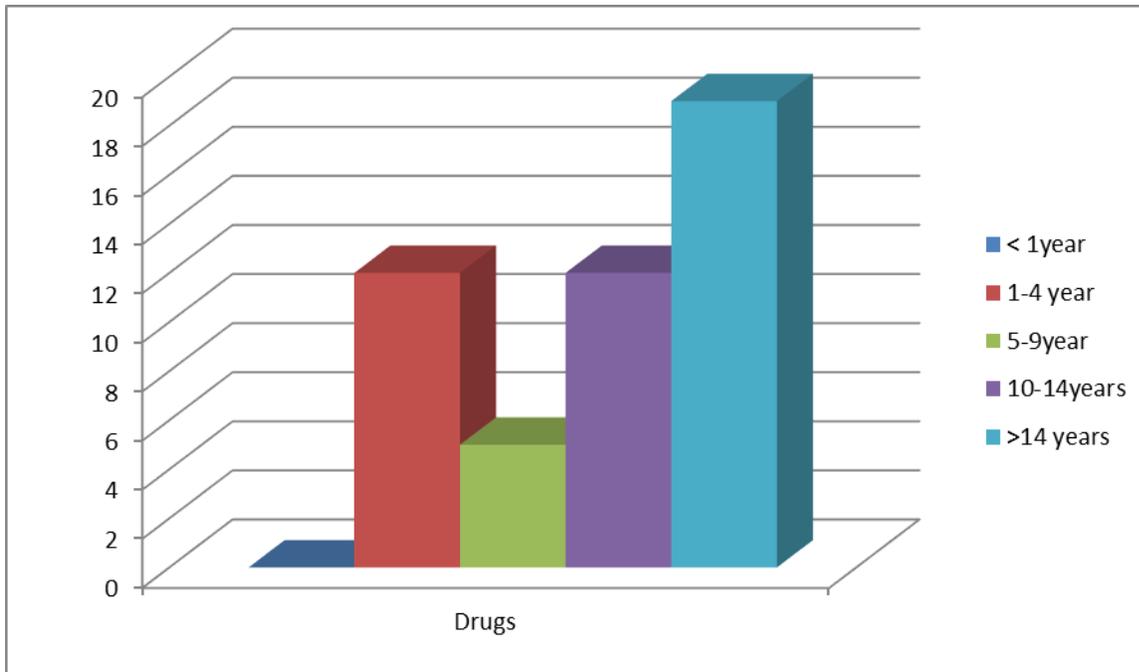


Figure3: Bar diagram showing age wise distribution of drug poisoning in children and adolescents

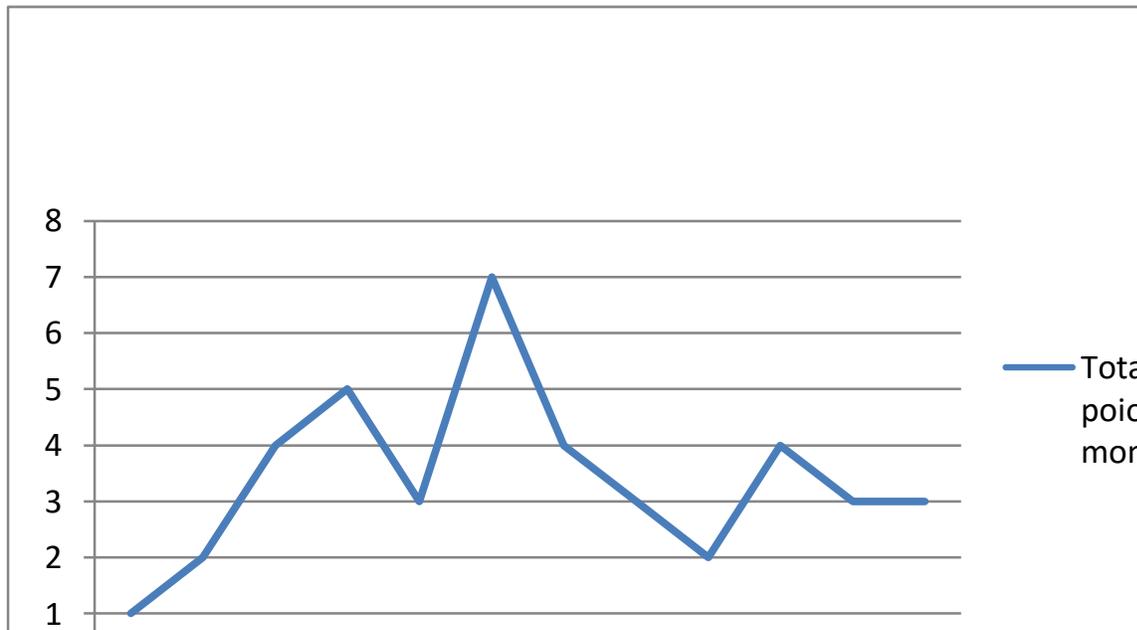


Figure 4 :showing drug poisoning in different months of years

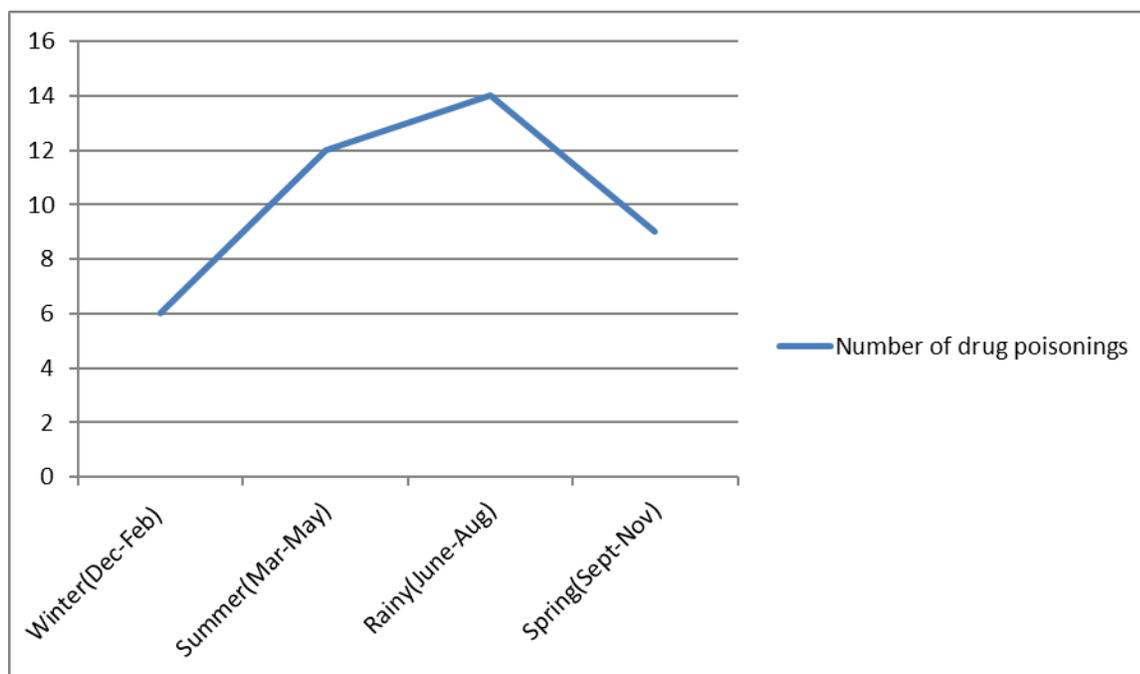


Figure 5: Drug poisoning incidence in different seasons of year

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