Clinical Profile and Outcome of Poisoning in Children Admitted to a Tertiary Care Hospital

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To cite this article:

Received: May 18, 2020; Accepted: May 29, 2020; Published: June 15, 2020

Abstract: Background: Childhood poisoning is one of the emergencies commonly encountered in paediatric practice. Accidental poisoning accounts for most of the cases in childhood poisoning and is preventable. Intentional poisoning becomes more likely in adolescent age group. Average incidence among varies studies range from 0.3% to 7.6%. Male children predominate the poisoning accidents accounted for by their greater degree of activity and more number of cases belong to poor socioeconomic status because of less space. Methodology: All children less than 18 years of age admitted in our PICU and pediatric ward with history of poisoning or intoxication during the study period from October 2017 to September, 2019. Children with chronic poisoning, snake bite, scorpion sting and other poisonous bite, idiosyncratic reactions to drug and food poisoning were excluded from the study. Results: 101 children were admitted with history of poisoning. Most of the cases were accidental. The most common age group was 1-3 years. Maximum families belonged to Lower Middle socioeconomic status. Hydrocarbon (Kerosene) was the most common poison. Suicidal poisoning was more common in the 13-18 year age group and more common in female sex. Vomiting was the most common presentation Specific antidote was used in 21.78% cases. The mean duration between poisoning and presentation was 3.1 hours. The mean duration of hospital stay was 4.2 days. Mortality rate was 2.97%. Conclusion: Childhood poisoning is one of the pediatric medical emergencies like other emergencies and causes significant morbidity and mortality in children. Most of the accidental poisoning is seen in less than 5 years age group due to their innovative character, exploratory nature and mouthing tendencies. Despite of rapid socioeconomic changes, Kerosene is still the commonest agent involved in pediatric poisoning mainly because it is commonly used household item.

Keywords: Childhood Poisoning, Accidental, Kerosene, Outcome

1. Introduction

Childhood poisoning is one of the emergencies commonly encountered in paediatric practice. Accidental poisoning accounts for most of the cases in childhood poisoning and is preventable. Intentional poisoning becomes more likely in adolescent age group. Most exposures among children are often unintentional and mainly due to their curious nature. Most of the cases in childhood poisoning are oral ingestion that occur at home. [1] Many poisoning cases in childhood is a result of oral consumption of poisonous agents that are easily accessible to children in homes. These agents are often mistaken by children for soft drinks or water [2].

Average incidence among varies studies range from 0.3% to 7.6%. [2-6] The poisoning type and incidence of poisoning also differ from hospital to hospital and has a special bearing on the emergency paediatrics centre of the area. [7-9].

Accidental poisoning is common in the preschool or toddler age group (less than 5 years) because the children up to this age have exploratory tendency for the substance by taking it into the mouth while the suicidal poisoning is due to arguments with parents or stress. [10]

Male children predominate the poisoning accidents accounted for by their greater degree of activity and more number of cases
belong to poor socio economic status because of less space. The present day households offer toxic substances at every corner including caustics, insecticides and medicines which are easily accessible to children.

2. Methodology

This was a Prospective, Observational Study, conducted for a period of two years from October 2017-September 2019 in Department of Pediatrics in Jawaharlal Nehru Hospital & Research Centre (JLNH&RC), Bilai, Chhattisgarh. All children less than 18 years of age admitted in our PICU and pediatric ward with history of poisoning or intoxication during the study period from October 2017 to September 2019. Children with chronic poisoning, snake bite, scorpion sting and other poisonous bite, idiosyncratic reactions to drug and food poisoning were excluded from the study.

2.1. Protocol

Children admitted with history of poisoning in PICU, and pediatric ward during study period will be studied regarding age, sex and social demographic data. Ethical committee clearance was obtained in our hospital to conduct our study. Informed consent obtained from the parents and care givers of the children before including them in our study. Details of the poison will be noted as name, type of agent, route of exposure, time of arrival to hospital after poison exposure and manner of poisoning.

Complete Clinical examination done including vital signs, general examination, and systemic examination. Necessary investigations will be done according to the type of poisoning like complete blood hemogram, renal function test, liver function test, chest-x ray, electrocardiography, echocardiography, urine routine, ultrasound abdomen, cholinesterase level, ABG analysis, serum calcium, serum electrolytes and treatment given according to standard protocol including psychiatric counseling.

2.2. Statistical Methods

The data was analyzed and tabulated using the SPSS package, software version 16.0. Descriptive statistics (mean) were used for data presentation. Pearson.

Chi-square test is used to test significant difference in proportion between two.

Groups and more than two groups. A probability of less than 0.05 was.

Considered statistically significant.

3. Results

During the period of 2 years from October 2017 to September 2019, 101 children got admitted in our hospital with history of poisoning. 80 cases were accidental and 21 were suicidal. The most common age group involved was 1-3 years. The median age of case was 3.70 years. 56 were male children and 45 were female children. Male to female ratio was 1.24: 1.

Most of the Parents were educated up to Middle school level. Maximum (57.42%) families belonged to Lower Middle socioeconomic status. Hydrocarbon was the most common poison (40.59%), followed by insecticides (18.81%), drugs, (9.4%), corrosives and plant group. Kerosene (32.67%) was the most common agent implicated, followed by OPC (9.9%), pyrethrums (8.91%), mineral spirit (7.92%), alprazolam tab (4.95%) and camphor (3.96%). Most of the cases of kerosene poisoning, parents belonged to lower middle socioeconomic status according to modified Kuppuswamy scale. This is because of the reason that kerosene oil is the most common household fuel used in lower middle class group families. Accidental poisoning (79.21%) was the most common mode of poisoning and (20.79%) cases were suicidal. None of the cases were homicidal. 1-3 years age group was the most common age group implicated in accidental poisoning (58.42%) with male predominance. Suicidal poisoning was more common in the 13-18 year age group and more common in female sex. Route of poisoning in all cases was by oral ingestion. 10.89% were given pre-referral treatment in the form of gastric lavage, oxygen, etc and 89.11% were not given pre-referral treatment and brought directly to the higher centre. Maximum number of cases (49.5%) reached the hospital within 1-2 hours. 17.82% cases were asymptomatic at presentation and during observation period in the hospital. Most of these were of 1-3 years age group {17.58% (n12)} where actual type of poison and quantity of ingestion was not sure. In other children who presented with symptoms, vomiting was the most common presentation (35.64%), tachypnoea (12.87%) cough (11.88%), altered sensorial (10.89%), least being dizziness (3.96%) and bleeding diathesis (0.99%). Specific antidote was used in 21.78% cases where as 78.22% cases received no specific antidote. The mean duration of hospital stay was 4.2 days. 36.63% were discharged in 2-3 days, 33.6% (in 3-5 days and 19.8% in 4-5 days. Mortality rate was 2.97% and 97.03% survived.

Table 1. Educational Status of Parents.

<table>
<thead>
<tr>
<th>Educational status of parent</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>1</td>
<td>0.99</td>
</tr>
<tr>
<td>Primary</td>
<td>7</td>
<td>6.93</td>
</tr>
<tr>
<td>Middle school</td>
<td>64</td>
<td>63.37</td>
</tr>
<tr>
<td>Secondary</td>
<td>1</td>
<td>0.99</td>
</tr>
<tr>
<td>Higher School</td>
<td>18</td>
<td>17.82</td>
</tr>
<tr>
<td>Graduate</td>
<td>10</td>
<td>9.9</td>
</tr>
<tr>
<td>Total</td>
<td>101</td>
<td>100</td>
</tr>
</tbody>
</table>
Figure 1. Pie Chart Showing Age Wise Distribution.

Figure 2. Agent of Poison in Relation To Socioeconomic status.
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Figure 3. Bar Diagram showing Mode of Poisoning.

Figure 4. Bar Diagram showing association of Mode of Presentation in relation to age.

Table 2. Type of poisoning in relation to age.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Type of poisoning</th>
<th>Drugs</th>
<th>Hydrocarbon</th>
<th>Insecticide</th>
<th>Household</th>
<th>Corrosive</th>
<th>Irritant</th>
<th>Plant</th>
<th>Total</th>
<th>Chi sqr/P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td></td>
<td>1 (16.67%)</td>
<td>2 (33.33%)</td>
<td>2 (33.33%)</td>
<td>1 (16.67%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>6 (100%)</td>
<td>65.50/P&lt;0.0001</td>
</tr>
<tr>
<td>1-3</td>
<td></td>
<td>8 (13.56%)</td>
<td>35 (59.32%)</td>
<td>9 (15.25%)</td>
<td>4 (6.78%)</td>
<td>1 (1.69%)</td>
<td>1 (1.69%)</td>
<td>1 (1.69%)</td>
<td>59 (100%)</td>
<td></td>
</tr>
<tr>
<td>4-6</td>
<td></td>
<td>3 (23.08%)</td>
<td>4 (30.77%)</td>
<td>3 (23.08%)</td>
<td>2 (15.38%)</td>
<td>0 (0%)</td>
<td>1 (7.69%)</td>
<td>0 (0%)</td>
<td>13 (100%)</td>
<td></td>
</tr>
<tr>
<td>7-12</td>
<td></td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>5 (83.33%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (16.67%)</td>
<td>6 (100%)</td>
<td></td>
</tr>
<tr>
<td>13-18</td>
<td></td>
<td>7 (41.18%)</td>
<td>0 (0%)</td>
<td>5 (29.41%)</td>
<td>0 (0%)</td>
<td>5 (29.41%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>17 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

Chi square for type of poisoning according to age group from 0-18 year- X2 is 65.50 p<0.001-which is significant.

Table 3. Mode of poisoning in relation to age.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Mode of poisoning</th>
<th>Accidental</th>
<th>Suicidal</th>
<th>Total</th>
<th>Chi sq/P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td></td>
<td>6 (100%)</td>
<td>0 (0%)</td>
<td>6 (100%)</td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td></td>
<td>59 (100%)</td>
<td>0 (0%)</td>
<td>59 (100%)</td>
<td>92.90/ p&lt;0.0001</td>
</tr>
<tr>
<td>4-6</td>
<td></td>
<td>13 (100%)</td>
<td>0 (0%)</td>
<td>13 (100%)</td>
<td></td>
</tr>
<tr>
<td>7-12</td>
<td></td>
<td>2 (33.33%)</td>
<td>4 (66.67%)</td>
<td>6 (100%)</td>
<td></td>
</tr>
<tr>
<td>13-18</td>
<td></td>
<td>0 (0%)</td>
<td>17 (100%)</td>
<td>17 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

Chi square of p-value in mode of poisoning with relation to age group is <0.0001-significant.
Table 4. Prereferral treatment.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Pre referral Treatment</th>
<th>Total</th>
<th>Chi sq/ P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>2 (33.33%)</td>
<td>4 (66.67%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>1-3</td>
<td>2 (3.39%)</td>
<td>57 (96.61%)</td>
<td>59 (100%)</td>
</tr>
<tr>
<td>4-6</td>
<td>3 (23.08%)</td>
<td>10 (76.92%)</td>
<td>13 (100%)</td>
</tr>
<tr>
<td>7-12</td>
<td>2 (33.33%)</td>
<td>4 (66.67%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>13-18</td>
<td>2 (11.76%)</td>
<td>15 (88.24%)</td>
<td>17 (100%)</td>
</tr>
</tbody>
</table>

In our study, 10.89% (n=11) were given pre-referral treatment in the form of gastric lavage, oxygen, etc and 89.11% (n=90) were not given pre-referral treatment and brought directly to the higher centre.

chi-square of p- value 0.020 is significant.

Figure 5. Pie chart showing use of specific antidote

Figure 6. Pie Chart Showing the Outcome of Poisoning Cases

4. Discussion

Highest number of cases occurred in 1-3 years age group. Incidence of poisoning is highest in 1-3 years age group in Vasanthan et al study [11] Nowneet et al study [12] and Sil et al study [13]. Children with age less than 5 years of age have been affected more in concordance with many literature reports [11, 20-22]. The incidence in this age group is due to inherent inquisitiveness and higher oral exploratory activity aided by their newly acquired mobility and hand skills. The second most common age group affected was 13-18 year age group that is in concordance with studies conducted by Arindam [15] et al, Mahvish [18] et al and Basavraj [19] et al.

There was higher incidence of poisoning in male children in our study with which is similar to many studies with male predominance [12, 13, 16, 17, 19, 20].

There was female preponderance in our study in 13-18 year age group that is in concordance with studies conducted earlier. [15]

In Most of the cases, parents belong to lower middle class group (65.7%) according to modified kuppuswamy scale, probably due to less educational qualification, more number of family members, less storage spaces and overcrowding in these families. A similar study pattern was observed in a study done by Vasanthan et al, [11] Ahamed et al, [23] Pyarelal kajala. [24]

Among the type of poisoning, Hydrocarbon (Kerosene oil) was the most common agent involved. It shows kerosene oil being the most common household fuel used in lower middle class group families. Since, it is kept in bottles in Kitchen, children mistakenly drink it as water or playing with it due to curiosity. Similar results were found in previous studies. [13, 14, 16, 17] Although other studies by Mahvish [18] et al, Nowneet [12] et al and Budathoki [20] et al found insecticides as the most common agent and studies conducted by Arindam [15] and Basavraj [19] et al found drugs as the most common agent.

Among hydrocarbons, the second common agent after kerosene was mineral spirit, usually mixed with paints for painting the houses. It also comes under hydrocarbons group. Children accidently drink it as water. This type of poisoning is found in the families of children involved in the building and construction work.

Insecticides were the second most common type of poison involved. OPC being the most common insecticides, followed by pyrethrin. This is in concordance with study conducted by MODI [25] et al. Drugs were the third common agent involved. Drugs involved were paracetamol, vitamin B complex, multiple drugs, antihypertensives, valproate, phenytoin, amitryptiline and thyroxine.

Significant cases also occurred in adolescent age group.

Household agents involved were camphor, naphthalene, rat killer paste, etc.

Corrosives accounted for 5.94% of total poisoning. We had 2 cases of dhatura poisoning and mercury poisoning.

Most of the cases admitted to our hospital belonged to lower middle socioeconomic status. Hydrocarbon and organophosphorus being more common among them as compared to drug ingestion and corrosives seen in higher in those belonging to higher socioeconomic status.

The most common mode of poisoning was accidental,
followed by suicidal. None of the cases were homicidal. Accidental mode of poisoning is more common in 1-3 year age group with male predominance because male children are more active. The reason behind the 1-3 year age group more involved is that these children have exploratory nature and more often, they are looked after by their grandparents because of parents going for work. It is cumbersome to have a look after these children round the clock.

Suicidal was the next common mode, the reason behind being the fear of parents scolding them for poor school performance and family dispute. Agents used for suicidal poisoning were drugs, corrosives and insecticides. Adolescents were most commonly involved in suicidal poisoning and there was female predominance over males in concordance with other studies. [15, 26]

Route of poisoning in all cases of our study was by oral ingestion.

Majority (89.11%) of the child admitted had not received any pre-referral treatment. Only 10.89% had received pre-referral treatment in form of gastric lavage, atropine, oxygen, etc. the difference was significant. This was probably due to tendency for seeking treatment in higher centres in cases of poisoning.

The mean duration of poisoning and presentation was 3.1 hours. The duration of poisoning was shorter in urban population as compared to rural population. This could be explained by the longer distance that these rural patients travelled to reach our hospital and also received initial treatment at a nearby hospital. This was similar in study done by Kohli et al [1]

The most common mode of presentation was vomiting, followed by tachypnoea and cough. Other common manifestations were altered sensorium, abdominal pain, seizures and giddiness.

Children received various forms of treatment. Most of the cases received supportive treatment in form of gastric lavage, oxygen, I. V. fluids and other supportive treatment.

Among 101 children, only 21.78% received antidotes like atropine, PAM, physostigmine and NAC and vitamin K when indicated and this observation is in concordance with study done by Kohli [1] et al.

The majority of the patients required only longer duration of ICU stay as compared to insecticide poisoning cases.

In our study, the mean duration of hospital stay was 4.2 days and lesser in expired cases. This might be due to poor general condition of the child at presentation. Antidotes and supportive measures are less effective when there is much delay in presentation and poisoning.

The mean duration of hospital stay was as low as 0.66 days in a Nigeria study [27] to 3.78 days in Budhathoki [20] et al study.

In our study, 97.03% (n=98) of children survived and discharged. Death occurred in 2.97% (n=3) cases. The morality rate in our study is similar to studies done earlier [14, 15, 16, 23, 24]

There were total 3 deaths, 1 due to OPC, 1 due to multiple drugs ingestion and 1 due to Kerosene oil with male predominance. 66.67% death occurred in adolescent group.

Outcome was poor in children admitted to hospital more than 6 hours of presentation. This indicates the seriousness or criticality of the patients on admission.

When the child presented with altered sensorium, the outcome was poor.

All 3 cases who presented with altered sensorium died.

5. Conclusion

Childhood poisoning is one of the pediatric medical emergencies like other emergencies and causes significant morbidity and mortality in children. Most of the accidental poisoning is seen in less than 5 years age group due to their innovative character, exploratory nature and mouthing tendencies. Despite of rapid socioeconomic changes, Kerosene is still the commonest agent involved in pediatric poisoning mainly because it is commonly used household item. Most of the pediatric poisoning is due to improper supervision and this could be prevented by giving more attention to the children at home. Simple preventive measures like education of parents, keeping the household chemicals and medicines out of reach of children, storing them in their own containers (not in cold drink bottles and vessels for storing of food) and discarding the empty containers that are no longer needed. All these measures can reduce the incidence of poisoning in pediatric population. Suicidal poisoning is more predominant in adolescents, especially girls. Due to exam stress, conflict with parents and peer pressure. All suicidal cases should receive psychiatric counseling before leaving the hospital. There is the need for guidance and a counselor at every school as well as in the community.

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