Gender Difference in Acute Poisoning Cases in an Urban Area in Navi Mumbai, India

ABSTRACT

Background: Poisoning is a global health problem and one of the major causes of hospitalization through emergency department. In several studies, preponderance of males in younger age group and pesticide consumption has been reported.

Method: The present study was undertaken at MGM Hospital and Research Centre, Central Business District (CBD) Belapur, Navi Mumbai, India to study the epidemiological profile of acute poisoning cases; following a chance observation of female preponderance among poisoning cases attending the hospital. Acute poisoning cases, who visited the hospital during the period of five years from 1st July 2007 to 30th June 2012, were included in the study. The data were pooled into pre-designed variable structure for the analysis.

Results: A total of 234 poisoning cases have been reported, majority of which, reside in neighboring areas of Belapur and Kharghar inhabited by middle to high income population group. Out of them, 172 (69.51%) patients were in the age group of 16 to 35 years and mean age was 26 years. The female to male ratio was 1.75:1 and contrary to other comparative studies, this reverse gender trend was found statistically significant (p < 0.001). A total of 137 (58.55%) poisoning cases were married. However, the proportion of married women–92/149 (61.74%), was statistically significant, placing young married women at higher risk of poisoning (p < 0.0001). In 32 (13.68%) cases, poisoning was accidental, while in remaining 202 (86.32%) deliberate self-harm (DSH) was the reason. Among the poisons consumed, psychotropic drugs (24.79%), insecticides (11.54%) and disinfectants (11.11%) constituted the bulk.

Conclusion: This is the first study, in Maharashtra and one among few in the country, which has reported high preponderance of young married women among poisoning cases. Adverse male to female ratio (1000:893) in Thane district where Navi Mumbai is located, coupled with findings of high incidence of acute poisoning in females, is a clear indication of social distress among women in this part of the country.

Keywords: Gender, Hospital information systems, Poisoning, Urban population.


Source of support: Nil
Conflict of interest: None

INTRODUCTION

The word ‘poisoning’ has been defined variously by the experts and dictionary. Random house dictionary (1969) defines poisoning as ‘the condition produced by a poison or a toxic substance’. However, mere exposure to a poison or toxic substance may not be sufficient to produce the toxic effect of the poison. Poisoning has also been defined as ‘any exposure to a toxic quantity of a poison’. Such a definition calls for setting of toxic dose, which is not defined/set for every poison.

In order to address above difficulties, Goulding and Busik and Hindmarsh have defined poisoning as ‘any exposure to poison regardless of the dose and effect on the poisoned person’. However, each of these definitions, depending upon the one followed for estimation of the magnitude, may either over or underestimate the incidence.

World Health Organization (WHO), in first global estimate in 1990 based on extrapolation from limited data, estimated 3 million cases of pesticide poisonings and 2,20,000 deaths annually, majority of them being intentional. The nature of poison used depends on the socioeconomic factors, cultural diversity and easy availability. Based on the above factors, the pattern of poisoning may vary in different parts of the world and even in different parts of same country.

The WHO estimates, based on 2001 data, indicate that 8,49,000 people die globally from self-harm each year. However, poisoning is the commonest form of fatal self-harm in rural Asia, accounting for over 60% of all deaths, and is of far greater importance than hanging and other physical forms of self-harm.
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A national survey in Bangladesh showed that 14% of all deaths (3,971 out of 28,998) of women, between 10 and 50 years of age were due to self-poisoning, the majority with pesticides. The problem is particularly severe in Sri Lanka, where pesticide poisoning was the commonest cause of hospital death in six rural districts during 1995. With the progress in the industrial and agricultural field, and advances in medical sciences, a vast number of insecticides have become available, which on exposure may produce severe toxicity.

Information available in India is limited, with regard to acute poisoning in adults, including hospitalized patients. In general, accidental poisoning is more common in children, whereas suicidal poisoning is more common in young adults. It is important to know the nature and severity of poisoning in order to take appropriate preventive measures.

Primary objective of the present study was to examine gender difference, if any, among poisoning cases, and secondary objective was to study epidemiological profile of poisoning cases attending the emergency department following a chance observation of female preponderance among poisoning patients, contrary to male preponderance reported in majority of other Indian studies.

METHODS

The present study was undertaken at MGM Hospital and Research Centre, Central Business District (CBD), Belapur, Navi Mumbai. It was a retrospective hospital-records-based study, analyzing secondary data for the period of last 5 years, conducted after approval of authorities, and does have inherent limitations of records-based hospital studies.

In the present study, definition by Goulding and Busik has been followed to define a case of poisoning. Poisoning can be classified variously based on the agendas mentioned by WHO in 1977, host and environmental circumstances of poisoning, and severity of symptoms. Classification based on broad classes of environmental circumstances of poisoning as proposed by Proudfoot has been adopted in this study, which includes—accidental poisoning, deliberate poisoning, homicidal poisoning and non-accidental poisoning.

The records of 234 acute poisoning cases, excluding three deaths (about which the detailed data were not available), who visited hospital during the period of 5 years from 1st July 2007 to 30th June 2012 were included in the study. The data were pooled into pre-designed standardized variable structure for the analysis.

RESULTS

A total of 234 poisoning cases have been reported (2.72% of 8597 admissions through casualty and 1.64% of 14193 total hospital admissions during the study period), majority of which reside in dwelling units in neighboring areas of Belapur and Kharghar, which were either constructed and allocated by city and industrial development and construction organization (CIDCO) on the basis of income, i.e. low, middle and high income, or constructed by private builders and sold to the occupants. Majority of the cases pertain to residents residing in middle income and high income dwelling units. However, income information was not available in hospital records. Few cases were also reported from the adjacent slum areas that enjoy free or concessional services of the hospital.

Majority of the poisoning cases (91.88%) resided in CBD Belapur and adjoining Kharghar localities of Navi Mumbai. Geographical distribution of cases residing in Belapur and Kharghar areas of Navi Mumbai has been mapped in Figure 1. The sector eight of CBD Belapur urban area reported 27 cases of acute poisoning, which is the largest number from one particular sector.

The year and sex distribution of 234 cases of acute poisoning, which attended emergency department of the hospital during the period of study, has been shown in Graph 1. The number of cases seen over the period of 5 years suggests a sustained trend. The maximum number of cases were reported in the first quarter of the year (n = 70) and minimum in the last quarter (n = 42). Between 2007 and 2011, October was the only month to report minimum number of cases (n = 7).

As shown in Table 1, 172 (69.51%) patients were in the age group of 16 to 35 years and mean age of poisoning cases was 27.1 years. The youngest and the oldest victims of poisoning were 1 and 75 years old respectively. The proportion of females in the age group 16 to 35 years was higher and continued to remain high even among cases above 35 years. The female to male ratio was found to be 1.75:1 (females = 145, males = 85), and contrary to other comparative studies this reverse gender trend was found significant (p < 0.001). Female preponderance was noted, throughout the study period of 5 years.

Out of the 234 patients, 202 (86.32%) subjects took recourse to poisoning as a tool for deliberate self-harm as compared to the remaining 32 (13.68%), who were victims to accidental poisoning. The sex difference in selection of timing for poisoning was not observed. However, in majority of cases, poisoning took place in the afternoon and early night hours. A total of 137 (58.55%) cases were married individuals. Higher proportion of married individuals in acute poisoning was observed in both sexes as shown in Graph 2. However, proportion of young married females at the risk of acute poisoning was significantly higher (p < 0.001).
As shown in Table 2, poisoning agents belonged to various groups including—household products, agricultural pesticides, industrial chemicals, drugs, plants, etc. The household poisons mainly comprised of pyrethroids, rodenticides, carbamates, phenyl, detergents, corrosives, etc. The drugs implicated included benzodiazepines, anticonvulsants, analgesics, antihistamines, tricyclic antidepressants, antihypertensive, etc. Among the agricultural pesticides, organophosphates and herbicides were also consumed. The psychotropic drugs (24.79%), insecticides (11.54%) and disinfectants (11.11%) constituted the bulk.

In this study, it was noticed that out of 237 (n = 234 and three excluded), only three patients died with a death rate of 1.27%.

**DISCUSSION**

The present study has reported female to male ratio of 1.75:1 (females=149, males=85), which is contrary to the male preponderance reported in comparative studies in India (referred later). This female preponderance is not only statistically significant (p < 0.001), but also has been persistent throughout the study period.

**Table 1: Age and sex-wise distribution of poisoning cases**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–5</td>
<td>8</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>6–15</td>
<td>3</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>16–25</td>
<td>30</td>
<td>61</td>
<td>91</td>
</tr>
<tr>
<td>26–35</td>
<td>27</td>
<td>54</td>
<td>81</td>
</tr>
<tr>
<td>36–45</td>
<td>8</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>46–55</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Above 55</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>149</td>
<td>234</td>
</tr>
</tbody>
</table>
The study further reported higher proportion of married individuals in acute poisoning in both sexes. However, proportion of young married females at the risk of acute poisoning was significantly higher (p < 0.001). Other Indian studies have shown married men to be at more risk, contrary to these findings.9

The findings of the present study are at variance from majority of studies in India, as it reports strong association of young females as major victims of acute poisoning. There are also few studies from South-east Asian countries, which have reported females as the major victims of acute poisoning like—Nepal,17,18 Malaysia,19 Thailand,20 and West Bengal, India.21 A few studies from Europe have also observed similar findings.22,23 The present study area, Navi Mumbai, being an urban area has socio-demographic profile akin to urban areas worldwide including western societies, and thus presents poisoning profile more similar to the scenario in other urban areas. A study from Vellore has shown an increasing trend of self-poisoning,12 especially among young adults. Many studies have shown that deliberate poisoning has far higher morbidity and mortality than accidental-poisoning. Our findings are similar to those reported bynumber of other investigators in India and abroad.

The nature of poison consumed usually depends on easy accessibility, and similar observation has been made in the present study also. These study findings are comparable with similar studies undertaken in urban areas in India.25,26 In contrast to majority of studies on acute poisoning among predominantly rural population, which have reported preponderance of organophosphorus compounds (OPCs) and other pesticides commonly used for agricultural purposes, a distinct pattern of poisoning was noted among male and female cases of poisoning. The females preferred drugs in general and psychotropic drugs in particular for poisoning, while males preferred alcohol mixed with psychotropic drugs, insecticides and rodenticides. The preponderance of young males and OPCs as the preferred poison have been reported uniformly in various studies undertaken in urban and rural areas in northern,24,25 southern9,27 and western28,29 India. Many of such studies, though hospital based, had large number of victims from rural areas where OPCs are easily accessible.

It is interesting to note that researchers in India across the country, irrespective of rural or urban background, have reported preponderance of acute poisoning among young males. Studies conducted by Vaidya and Hulke,28 and Zine and Mohanty,29 in Maharashtra; Unnikrishnan et al.,9 Kanchar and Menezes,27 Bose et al.,30 and Ramesh et al.31 in Kerala; Kumar et al.32 in Andhra Pradesh; Jesslin et al.33 and Jaiprakash et al.34 in Karnataka; Gargi et al.24 and Singh et al.35 in North India, have reported young male preponderance among poisoning cases contrary to our findings.

The Navi Mumbai area belongs to Thane district of Maharashtra state. This district has one of the lowest sex ratio (893:1000—Census 2001) in the country. Hence, these findings send alarming signals to the public health authorities for critical examination of gender issues in the area.

A comparative data revealed that, in developed countries, the mortality rate due to poisoning is only 1 to 2%; but in developing countries like India,35 it varies from 15 to 30%, and is the fourth most common cause of mortality, especially in rural India.9,12

CONCLUSION

The present study provides an insight into the epidemiological trend of poisoning in urban India. The study clearly establishes a significant association of young married women and acute poisoning in urban area. Male to female ratio in Navi Mumbai is one of the lowest in India, coupled with findings of high incidence of acute poisoning in females; it is a clear indication of social distress among women in this part of the country. There is a need of more research work for in-depth study of psychosocial factors contributing to acute poisoning among young population in general, and women in particular.

Table 2: Type of poisons consumed

<table>
<thead>
<tr>
<th>Poison</th>
<th>Male No.</th>
<th>Male %</th>
<th>Female No.</th>
<th>Female %</th>
<th>Total No.</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household poisons</td>
<td>37</td>
<td>43.53</td>
<td>53</td>
<td>35.58</td>
<td>90</td>
<td>38.47</td>
</tr>
<tr>
<td>Drugs</td>
<td>33</td>
<td>38.83</td>
<td>66</td>
<td>44.30</td>
<td>99</td>
<td>42.30</td>
</tr>
<tr>
<td>Agricultural pesticides</td>
<td>7</td>
<td>8.23</td>
<td>6</td>
<td>4.02</td>
<td>13</td>
<td>5.55</td>
</tr>
<tr>
<td>Not known</td>
<td>8</td>
<td>9.41</td>
<td>24</td>
<td>16.10</td>
<td>32</td>
<td>13.68</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>100</td>
<td>149</td>
<td>100</td>
<td>234</td>
<td>100</td>
</tr>
</tbody>
</table>

Graph 2: Marital status of poisoning cases

Table 2: Type of poisons consumed
The large gender difference and young age suggests need for focused efforts to regulate the sale of commonly used poisons. Also, counseling services in schools and colleges to inculcate healthy attitudes and practices in younger generation, and promotion of self-help groups in community to help married women, are suggested. It would require the united efforts of multiple sectors to stop the beginning of the end, effectively.

REFERENCES