Epidemiology of intentional self-poisoning in rural Sri Lanka

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Summary We investigated the epidemiology of intentional self-poisoning in rural Sri Lanka by prospectively recording 2189 admissions to two secondary hospitals. Many patients were young (median age 25 years), male (57%) and used pesticides (49%). Of the 198 who died, 156 were men (case fatality 12.4%) and 42 were women (4.5%). Over half of female deaths were in those under 25 years old; male deaths were spread more evenly across age groups. Oleander and paraquat caused 74% of deaths in people under 25 years old; thereafter organophosphorous pesticides caused many deaths. Although the age pattern of self-poisoning was similar to that of industrialised countries, case fatality was more than 15 times higher and the pattern of fatal self-poisoning different.

Declaration of interest None.

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Intentional self-poisoning is a major problem worldwide (Hawton & van Heeringen, 2002). In industrialised countries, it predominantly occurs in young people impulsively responding to stressful events who have little desire to die. Deaths are rare, since the medicines ingested are of low toxicity or easily treated. The situation is different in the developing world, where pesticides are the most popular means of self-poisoning (Gunnell & Eddleston, 2003) and cause an estimated 300 000 deaths each year. Relatively little is known about the age and gender patterns of fatal and non-fatal self-poisoning in such regions. This study aimed to identify the poisons used in an agricultural area of Sri Lanka, with the expectation that such knowledge will direct future campaigns to prevent self-harm.

RESULTS

A total of 2189 patients with acute self-poisoning were identified over the study period; 68 had occupational or unintentional exposure and their data are not analysed here. Males accounted for more cases (n=1257, 57%) than females. The overall median age was 25 years (interquartile range (IQR) 19–35); female cases were younger than males: median age 21 (IQR 17–29) v. 29 years (IQR 22–40). The 5-year age band with the highest number of cases was 15–19 in women and 20–25 in men. The most common poisons ingested were pesticides (49%), particularly by men (males 59%, females 35%), and oleander seeds (34%; males, 31%, females 38%). Oleander was the poison most commonly used by females and males under the age of 20. From age 20, pesticide ingestion became more common in both genders. Medicines and hydrocarbons (commonly kerosene) were more often taken by women than men (18% v. 3% and 6% v. 2%, respectively).

A total of 198 patients died, giving a case fatality ratio of 9.0%, which was higher in males (12.4%) than in females (4.5%). Over half (52%) of female deaths occurred in women under 25; male deaths were spread more evenly, with only 22% of deaths occurring in men under 25 (Fig. 1). Case fatality increased with age. In a logistic regression model controlling for gender and type of poison taken, the risk of death increased by 62% (95% CI 43–81) per 10-year increase in age and was 52% (95% CI 4–124) higher in males than females. Oleander and paraquat were the most important cause of death in both genders under 25 years (Fig. 1), accounting for 74% of deaths. Pesticides in general, and organophosphates in particular, became more important thereafter, responsible for at least 80% (organophosphates 40%) of deaths over the age of 25.

After controlling for age and gender in logistic regression models with medicines as the reference category, the odds ratios for death among patients poisoned by pesticides other than paraquat was 8.7 (95% CI 2.1–36.2), by paraquat 102.0 (95% CI 22.8–456.4) and by oleander 7.2 (95% CI 1.7–30.5).

DISCUSSION

The age-specific pattern of self-poisoning in rural Sri Lanka is similar to that in industrialised countries: most cases occur in young people, and the incidence peaks around age 15–25 years (5 years earlier in females than in males) and then falls steadily with increasing age (for comparison, see Gunnell & Eddleston, 2003: Fig. 1). There are, however, a number of important differences. Male patients outnumbered women by 1.35:1 – the reverse of most other regions (Hawton & van Heeringen, 2002). The case fatality ratio for self-poisoning patients admitted to Sri Lankan secondary hospitals (9%) is much higher than in industrialised countries (e.g. 0.5% in the UK). A significant number of deaths (52% of female deaths, 11% of all deaths) occur in women under 25 years. A similar pattern of fatal self-poisoning...
in young women is seen in rural areas of China and India (Phillips et al., 2002; Joseph et al., 2003).

Our data were drawn from secondary hospitals and are not directly comparable with population-based statistics. Patterns of transfer from rural hospitals, in particular an increased tendency for transfer of men, would have biased the pattern of admission. A preliminary study has so far found no gender bias for transfers, nor evidence of more women dying before transfer to the secondary hospitals. The case fatality ratio would have been lower if all patients admitted to rural hospitals were transferred, but still several times higher than in the West.

The substances used in fatal poisoning varied with age and with gender. Yellow oleander was most commonly used by people under 20. Paraquat was important in young people; after the age of 30 other pesticides (particularly organophosphates and non-paraquat herbicides) became more important. All are much more difficult to treat than the medicines that are commonly used for self-poisoning in the West.

This study supports the view that organophosphate pesticides are important causes of fatal self-poisoning in south Asia (Roberts et al., 2003). Paraquat and oleander may be more important in women and young people because these substances are highly toxic and even small amounts can kill.

The case fatality ratio rose steeply with age in men and women. This may reflect a greater level of intent in older patients, a greater use of pesticides for self-poisoning, or a problem of comorbidity. Overall, the higher case fatality is predominantly due to the availability of highly toxic poisons and the difficulty of medical management. Restriction of access to highly toxic pesticides, plus improved medical therapy and antidote availability, could rapidly reduce the number of self-poisoning deaths in the rural developing world.

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