Published in final edited form as:
Br J Psychiatry. 2006 September ; 189: 278–279. doi:10.1192/bjp.bp.105.018671.

Physical Vulnerability and Fatal Self-harm in the Elderly

Michael Eddleston[1,2], **Mathisha Dissanayake**[2], **MH Rezvi Sheriff**[2], **David A Warrell**[1], and **David Gunnell**[3]

[1] South Asian Clinical Toxicology Research Collaboration
Centre for Tropical Medicine,
Nuffield Department of Clinical Medicine,
University of Oxford, England

[2] Ox-Col Collaboration, Department of Clinical Medicine,
University of Colombo, Sri Lanka

[3] Department of Social Medicine,
University of Bristol,
Bristol, UK.

Summary

Although the high rate of elderly suicide is conventionally explained as being due to greater intent to die, we have noted elderly Sri Lankans dying after relatively mild poisoning. Using data from yellow oleander poisoning, we investigated the effect of age on outcome in 1697 patients, controlling for gender and amount ingested. In fully-adjusted models, people aged >64yrs were 13.8 (95%CI 3.6-53.0) times more likely to die than those aged <25yrs. The high number of elderly suicides globally is likely to be due, in part, to the difficulty they face in surviving the effects of both the poisoning and its treatment.

Declaration of interest: None. Funding detailed in acknowledgements.

Fatal self-harm is a global problem responsible for around 1 million deaths each year (World Health Organization, 2001; Krug *et al*, 2002). In most countries, the highest incidence is in elderly people, in part because self-harm is more often fatal in the elderly (Spicer & Miller, 2000; Miller *et al*, 2004; Muhlberg *et al*, 2005). The high incidence is commonly explained by elderly people using larger amounts of poison or more lethal methods, and being more intent on dying, due to chronic illness and social isolation (Harwood & Jacoby, 2000; Conwell *et al*, 2002; Krug *et al*, 2002).

One contributor to the age-related pattern of fatal self-harm that is little discussed is the physical vulnerability of elderly people. Elderly people may die more often than young people after self-harm because their bodies may be unable to cope with either the act or its treatment (Conwell *et al*, 2002). It has so far been difficult to assess this vulnerability while controlling for severity of the attempt since data on, for example, the height jumped or the number of tablets ingested as markers of severity are not readily available.

The most common single poison taken for self-harm in Sri Lanka is yellow oleander (*Thevetia peruviana*) seeds (Eddleston *et al*, 1999; Eddleston *et al*, 2005a). Compared to other poisons, oleander seeds are highly toxic in small quantities. Most patients take between one and seven seeds and on admission find it easy to recall exactly how many they

Address for correspondence: M Eddleston, Dept of Clinical Medicine, Faculty of Medicine, University of Colombo, POBox 271, 25 Kynsey Road, Colombo-08, Sri Lanka. Fax: +44-20-7900-3445. eddlestonm @eureka.lk.

Europe PMC Funders Author Manuscripts

Europe PMC Funders Author Manuscripts

have ingested. Since it is therefore possible to quantify the number of seeds ingested, and thereby control for the severity of the attempt, we have been able to use oleander seed poisoning to look at the effect of age on outcome, independent of the act's severity. We have recruited over 1900 oleander poisoned patients to a cohort study that has allowed us to address the issue of physical vulnerability in self-harming elderly people.

Methods

All patients admitted to the adult medical wards of Anuradhapura or Polonnaruwa general hospitals were seen on admission and managed following a standard protocol. The number of seeds ingested, possible confounders, and outcome were recorded prospectively by study doctors. We used the programme Stata for analyses.

An RCT of superactivated charcoal (ISRCTN02920054) was nested within this cohort until its termination on 16th October 2004 when no effect of charcoal on outcome was noted (Eddleston *et al*, 2005b). Ethics approval was received from Colombo, Sri Lanka, and Oxfordshire research ethics committees.

Results

Between 31st March 2002 and 22nd October 2004, 1939 oleander poisoned patients aged 12 to 77 yrs were recruited to the cohort (median age 21; 1021 male, 52.7%). The number of seeds ingested was reported by 1697/1939 (87.5%) patients and varied from 0.25 to 30 (median 3.0, inter-quartile range 2 to 5). Men ingested more seeds than women (median 3.5 vs. 3.0) and older people ingested more seeds than younger people (median number of seeds ingested by those aged <25: 3.5 vs. 4.5 in those aged 45 and over; Spearman's rank correlation between age and seed number $r=0.18$ $p<0.001$).

94 of 1939 patients (4.8%) died. The female case fatality was lower than the male (3.9% vs. 5.7%; odds ratio (OR) 0.68 [95% CI 0.44 to 1.04]). In sex-adjusted logistic regression models restricted to the 1697 subjects with data on seed number, the risk of death increased with age (OR 1.40 [95% CI 1.18 to 1.66] for every ten year increase in age). Additionally controlling for the number of seeds ingested, the odds ratio of death for every ten year increase in age was slightly attenuated (odds ratio 1.32 (95% CI 1.10 to 1.58) in age (figure 1). The OR of death for people over the age of 65 was 13.8 (3.6 to 53.0) compared to people under the age of 25.

In age/sex adjusted models, the number of seeds ingested was independently associated with risk of death - OR for every additional seed ingested: 1.21 (95% CI 1.14 to 1.28). Associations were unaffected in models controlling for whether or not the subject took part in the randomised trial or the treatment they received.

Discussion

Although the literature on fatal self-harm in the elderly always discusses their high intent to die,(Harwood & Jacoby, 2000; de Leo, 2001; Krug *et al*, 2002) their relative physical vulnerability to the act of self-harm and to its treatment is only rarely mentioned (Conwell *et al*, 2002). We have noted many elderly people dying in Sri Lanka from pesticides and oleander seeds who reported ingesting relatively small amounts (Eddleston *et al*, 2005a). However, we are unaware of any previous empirical study of their greater vulnerability to the effects of self-poisoning, controlling for the quantity of poison ingested.

Using the example of yellow oleander poisoning, we show in this study that the excess deaths in the elderly, when controlling for the amount of poison ingested and therefore

severity of the act, is due in part to the increased frailty of elderly people. Some of the vulnerability may result from co-morbid illnesses such as ischaemic heart disease that would make the use of atropine more hazardous. Another reason may be that the lower body weight of elderly people and/or their reduced elimination of poisons results in higher concentrations.

There are two main limitations to our analysis. First, inaccuracies in the reported number of seeds ingested will limit our ability to fully control for the effect of severity (as measured by the quantity of oleander consumed), leading to an over-estimate of the effect of age. Nevertheless, seed number was associated with case-fatality, and controlling for seed number in our model only slightly (by 20%) attenuated the associations we observed. Furthermore, unlike self-poisoning with pharmaceuticals in which tens if not hundreds of tablets are often ingested, the number of oleander seeds ingested is far fewer (median 3) and therefore the reported number ingested is likely to be reasonably accurate. Second, it is possible that other factors such as delays in seeking treatment or greater absorption of poison may contribute to their poorer outcome.

This study shows that the elderly are highly susceptible to the effects of poisoning and may die despite taking a relatively small amount of poison. This is likely to be true for all poisons and not just oleander poisoning. Suicide prevention efforts in this age group must involve not only improved mental health and social services, and restriction of access to lethal means, but also access to high quality medical treatment and antidotes to reduce the number of elderly patients who die from self-harm.

Acknowledgments

Acknowledgements We thank the Provincial Director, Hospital Directors, consultant physicians, and medical and nursing staff of the study hospitals for their support, the Ox-Col study doctors for their work, and Robin Jacoby for review. ME is a Wellcome Trust Career Development Fellow; funded by grant 063560 from the Tropical Interest Group to ME. The South Asian Clinical Toxicology Research Collaboration (SACTRC) is funded by the Wellcome Trust/NHMRC International Collaborative Research Grant 071669MA.

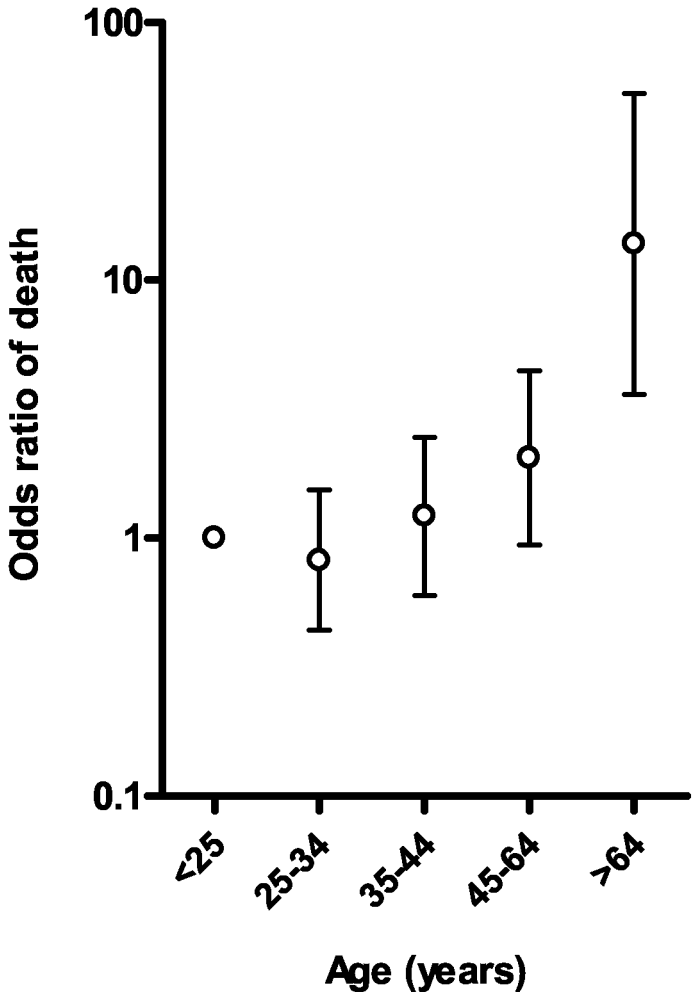
References

1. Conwell Y, Duberstein PR, Caine ED. Risk factors for suicide in later life. Biol.Psychiatr. 2002; 52:193–204.
2. de Leo D. Attempted and completed suicide in older subjects: results from the WHO/EURO Multicentre Study of Suicidal Behaviour. Int.J.Geriatric Psychiatr. 2001; 16:1–11.
3. Eddleston M, Ariaratnam CA, Meyer PW, et al. Epidemic of self-poisoning with seeds of the yellow oleander tree (Thevetia peruviana) in northern Sri Lanka. Trop.Med.Int.Health. 1999; 4:266–273. [PubMed: 10357862]
4. Eddleston M, Gunnell D, Karunaratne A, et al. Epidemiology of intentional self-poisoning in rural Sri Lanka. Brit.J.Psychiat. 2005a; 187:583–584.
5. Eddleston M, Juszczak E, Buckley NA, et al. Randomised controlled trial of routine single or multiple dose superactivated charcoal for self-poisoning in a region with high mortality (Abstract). Clin.Toxicol. 2005b; 43:442–443.
6. Harwood, D.; Jacoby, R. Suicidal behaviour among the elderly. In: Hawton, K.; van Heeringen, K., editors. The international handbook of suicide and attempted suicide. Chichester; UK: 2000. p. 275-291.
7. Krug, EG.; Dahlberg, LL.; Mercy, JA., et al. World report on violence and health. Geneva: 2002. Self-directed violence; p. 185-212.
8. Miller M, Azrael D, Hemenway D. The epidemiology of case fatality rates for suicide in the northeast. Ann.Emerg.Med. 2004; 43:723–730. [PubMed: 15159703]

9. Muhlberg W, Becher K, Heppner H-J, et al. Acute poisoning in old and very old patients: a longitudinal retrospective study of 5883 patients in a toxicological intensive care unit. Z.Gerontol.Geriat. 2005; 38:182–189.
10. Spicer RS, Miller TR. Suicide acts in 8 states: incidence and case fatality rates by demographics and method. Am.J.Publ.Health. 2000; 90:1885–1891.
11. World Health Organization. World Health Report 2001. Mental health: new understanding, new hope. World Health Organization; Geneva: 2001.

Europe PMC Funders Author Manuscripts

Europe PMC Funders Author Manuscripts



1. .
Odds ratio of death for oleander-poisoned patients, controlled for number of seeds ingested and grouped by age, relative to those under the age of 25 years.