

Does the nose know? Amitraz poisoning and olfaction

Andy Parrish, Ruth Lancaster

The initial clinical presentation of amitraz and organophosphate poisoning may be similar. Reduced serum pseudocholinesterase supports a diagnosis of organophosphate toxicity, but there is no similar laboratory test for amitraz poisoning. A 'mothball-like' odour associated with poisoned patients may have diagnostic potential. In a blinded controlled trial, 83% (95% confidence

interval, 63 - 93%) of 23 healthcare workers were able to distinguish between the odours of amitraz and organophosphates. Awareness of this simple component of bedside examination may allow earlier recognition of this potentially fatal poisoning.

S Afr Med J 2012;102:223-224.

To the Editor: Amitraz is an agricultural insecticide and veterinary pesticide used to treat ectoparasite infestations in animals. It has alpha-2-adrenergic agonist effects and inhibits monoamine oxidase. It is available in South Africa in concentrations of 12.5% and 25%, usually dissolved in xylene or tetrachloroethylene, which may contribute to CNS depression in poisoned patients. Poisoning may be accidental or deliberate.^{1,2} Patients present with nausea, vomiting, bradycardia and either miosis or mydriasis, which may result in misdiagnosis as organophosphate or carbamate poisoning. Evidence for poisoning with these substances is supported by reduced red blood cell acetylcholinesterase or serum pseudocholinesterase levels; however, there is no readily available diagnostic test for amitraz poisoning. Reduced consciousness, respiratory depression and hyperglycaemia may occur in amitraz poisoning,³ while excessive salivation, incontinence, or muscle fasciculations are unlikely. A good outcome is usually observed with adequate supportive care.^{4,5} Prompt recognition is important in deeply unconscious patients with pupillary changes, hypotension and respiratory depression.

Amitraz, its metabolites or solvents may contribute to a characteristic 'mothball-like' or 'dry-cleaning' odour in the poisoned patient, which is often particularly noticeable on endotracheal suctioning. Disagreement among clinicians about whether this smell is distinguishable from the odour of organophosphates includes dismissal of the odour as 'just another chemical smell'.

If the odour can be learnt and recognised, a safely stored reference sample could be made available for bedside comparison. Due to clinical staff turnover and the rarity of this poisoning, training to recognise the odour and an assessment of diagnostic consistency is unrealistic; therefore, a pragmatic trial was planned to assess the feasibility of a 'sniff and compare' technique.

Aim

To determine whether the odour of amitraz is sufficiently characteristic to be useful in differentiating amitraz from organophosphate solutions during blinded olfaction.

Department of Internal Medicine, Faculty of Health Sciences, Walter Sisulu University, East London Hospital Complex Section
A Parrish, MB ChB, DA (SA), FCP (SA), MMed (Med), MMedSci (ClinEpi)

Doctor of Pharmacy Programme, Faculty of Pharmacy, Rhodes University, Grahamstown, E Cape
R Lancaster, BPharm

Corresponding author: R Lancaster (givenruth@yahoo.co.uk)

Methods

The study was conducted at the East London Hospital Complex, consisting of both an urban and peri-urban hospital in the Eastern Cape. Volunteer subjects were pharmacists, doctors or nurses employed in the complex. Exclusion criteria included reported pregnancy and failure to provide written informed consent. The sample size ($N=23$) was based on an estimated sensitivity and specificity of 90% with a lower confidence interval (CI) of 70%. In the learning phase of the study, the subjects were introduced to the odours of amitraz, organophosphate and a control (distilled water) from labelled opaque glass bottles containing one undiluted drop of each ingredient on a cotton wool pledget. The bottle tops were replaced by foil with several small perforations. In the testing phase, individual subjects were taken to a separate room where coded opaque bottles containing the 3 samples were proffered according to a random computer-generated sequence. The subjects were asked to identify the content of each bottle by smell alone. Information recorded included gender, level of training, number of years in practice, and whether the subject reported a blocked nose.

Ethical and safety issues

The protocol was approved by the East London Hospital Complex Institutional Review Board. A fume hood was used to prepare the samples. Subjects were exposed to the samples twice, and did not make physical contact with the chemicals. Both phases of the study occurred in well-ventilated areas.

Results

There were 23 subjects, 11 of whom were female. The mean number of years in practice was 12 (standard deviation 11.3). Subjects included 12 medical officers (52%), 6 medical interns (26%), 3 consultants, 1 pharmacist, and 1 ICU-trained professional nurse (22%).

The sensitivity and specificity to detect amitraz compared with organophosphate were both 83% (95% CI 63 - 93%); 4 out of 23 subjects were unable to distinguish between the two. One subject suffered from chronic sinusitis; if excluded from the data set, the resultant sensitivity and specificity were both 86% (95% CI 67 - 95%). All subjects were able to distinguish between the control (water) and the test chemicals.

Discussion

Although amitraz poisoning is often initially misdiagnosed as organophosphate poisoning, the management thereof is different, and there is currently no readily available diagnostic test for this toxin. This study demonstrated the feasibility of using smell to identify amitraz, but is not proof of bedside value. The performance

of clinicians may improve with repeated exposure and testing with feedback; however, this may run the risk of sensory habituation, and deviate from the likely real-world application of the technique.

Conclusion

Identification of the 'mothball-like' odour associated with amitraz poisoning in severely ill patients should prompt vigorous resuscitation and support, with attention to respiration, blood pressure and glucose control.

References

1. Veale DJ, Wium CA, Muller GJ. Amitraz poisoning in South Africa: a two year survey (2008 - 2009). *Clin Toxicol* 2011;49:30-44. [<http://dx.doi.org/10.3109/15563650.2010.542159>]
2. Ulukaya S, Demirağ K, Moral AR. Acute amitraz intoxication in humans. *Intensive Care Med* 2001;27:930-933. [<http://dx.doi.org/10.1007/s001340100934>]
3. Shitole DG, Kulkarni RS, Sathé SS, Rahate PR. Amitraz poisoning - an unusual pesticide poisoning. *J Assoc Physicians of India* 2010;58:317-319.
4. Avsarogullari L, Ikizceli I, Sungur M, Sözüer E, Akdur O, Yücei M. Acute amitraz poisoning in adults: Clinical features, laboratory findings, and management. *Clin Toxicol* 2006;44:19-23. [<http://dx.doi.org/10.1080/15563650500357545>]
5. Elinav E, Shapira Y, Ofran Y, Hassin T, Ben-Dov I. Near-fatal amitraz intoxication: the overlooked pesticide. *Basic Clin Pharmacol* 2005;97:185-187. [http://dx.doi.org/10.1111.j.1742-7845.2005.pto_97399.x]

Accepted 9 February 2012.