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SHORT REPORT

A massive outbreak of food poisoning — a reminder of the importance of proper toxic waste control

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Because of rapid urbanisation in South Africa, scavenging from waste disposal sites by poor communities poses an increasing health risk. Reject cough lozenges, some of which contained larger amounts of dextromethorphan than usual, were illegally removed from a disposal site and, after resale by informal traders, caused moderately severe symptoms of toxicity in 171/540 (24%) primary school pupils. Although dextromethorphan was implicated as a cause, contributing effects of other toxins could not be excluded. Bacteriological cultures and a pesticide screen were negative. Had more toxic substances been involved, the consequences would have been disastrous. This incident supports calls for an integrated national waste management policy and waste control act to govern the management and control of waste from generation to disposal. Such a policy is necessary to prevent potentially serious incidents in the future.

S Afr Med J 1996; **86:** 551-552.

This study describes a food poisoning outbreak in 171 primary school pupils in Khayelitsha, an informal settlement near Cape Town. In spite of a better understanding of the aetiological factors associated with food poisoning and the availability of effective means of preventing outbreaks, many countries are experiencing an increase in food poisoning.[1,2] Reasons for this increase[3,4] specifically relevant to South Africa include rapid uncontrolled urbanisation, rapid population growth with an increase in establishments that serve food, and the absence of basic amenities in many dwellings. Scavenging from waste sites by poor communities is a cause for concern[5] as the peri-urban periphery increasingly encroaches on dumping sites.

Subjects and methods

One hundred and seventy-one pupils at a primary school in Khayelitsha developed symptoms suggestive of food poisoning. Initial history suggested that the symptoms were related to the ingestion of 'sweets' bought from informal hawkers at the school. All symptomatic pupils were admitted either to Groote Schuur Hospital or Red Cross War Memorial Children's Hospital for observation. A list of all admissions was obtained. Completeness was verified by comparison with school class lists of all symptomatic individuals. A random sample of 19% (32/171) was selected from the class lists. Subjects were questioned individually about type and quantity of foodstuffs consumed, the source, latent period and symptoms experienced. By visiting all classrooms during school hours with samples of all suspect products, asymptomatic individuals were identified. A random sample of 19% (100/540) of asymptomatic pupils were questioned about quantity, type and source of products consumed. In all, 711 pupils consumed the suspect 'sweets'. A sample of the suspect products was analysed for bacteriological activity by means of conventional agar culture methods and the Malthus technique.[6]

The hawkers identified were questioned about the source and whereabouts of residual stocks. Because of previous disposal of pesticides at the suspected dumping site, an as yet unpublished gas chromatographic method capable of detecting 0.01 parts per million was used to screen for organochloride- and organophosphate-based pesticides (State Laboratory, Cape Town — personal communication).

A Statgraphics 6 statistical package was used for statistical analysis. The Yates-corrected chi-square test was used to analyse the association between type of item consumed and the probability of becoming sick. Exact probabilities were calculated by means of Fisher's exact test.

Results

After induced vomiting and symptomatic treatment, all children admitted to hospital improved rapidly and were discharged within 10 hours of admission. The children's ages varied from 8 to 15 years with a median of 11 years. Five types of lozenges, distinguishable by shape and colour, were implicated.

Stomach cramps and headaches with dizziness were dominant (Table I). The median latent period was 2 hours. A crude attack rate of 24% was observed. Those who consumed type-1 lozenges only were more likely to have developed symptoms ($P = 0.03556$). No difference in probability of sickness could be indicated between the consumers and non-consumers of the other products. Because of incomplete data, a correlation between probability of sickness and the quantity of type-1 lozenges consumed could not be calculated.

Table I. Prevalence of symptoms in a sample of 32 children (%)

Stomach cramps	97
Headache and dizziness	72
Nausea	53
Vomiting	50
Blurred vision	38
Diarrhoea	22

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Microbiological results suggested no contamination other than that caused by handling by pupils and hawkers. No pesticide contamination was identified. Questioning of the hawkers resulted in the identification of a total of eight vendors. The source of the lozenge was identified as a resident of an informal settlement approximately 30 km away, which was adjacent to a waste disposal site. Tracing of batch numbers on some intact lozenge wrappings identified the pharmaceutical company which manufactured all four types of lozenge.

It was established that approximately 250 kg of the lozenges identified were products rejected by the manufacturing company and disposed of by a waste disposal company at the dumping site implicated. Types 2, 3 and 4 were type-1 precursor products of the same batch. Only the type-1 lozenge contained varying levels of a pharmacologically active substance, viz. dextromethorphan. Company policy dictated rejection of the entire batch. On inspection designated burial sites revealed no signs of tampering. There was no indication of a breach of security in the disposal process.

Discussion

Dextromethorphan is widely used as a cough suppressant in over-the-counter products.[7] Absorption from the gastro-intestinal tract is rapid and peak serum levels are achieved 2.5 hours after oral administration.[8] Maximum dosage per day is 60 mg in children aged 6 - 12 years.[8] In the case of the rejected lozenges, this dosage would have been exceeded by sucking 6 - 8 lozenges in quick succession. Short of massive overdosing, an acute dextromethorphan overdose seldom results in severe signs and symptoms.[8] With the exception of stomach cramps and headaches, the symptoms described in Table I have been associated with mild toxicity.[8,9]

The median latent period and comparison of those children who had consumed either types 1 or 2 exclusively provided weak support for the hypothesis that dextromethorphan was the causative agent. That other chemical contaminants had contributed to the symptoms could not be ruled out. Because of the benign course of the illness in all pupils, an extensive analytical search for contributing chemicals was not undertaken. Attending paediatricians were not convinced of the severity of stomach cramps and identified a prominent psychosomatic component.

It was eventually ascertained that some personnel of the waste removal company were co-operating with scavengers at the dumping site from which rejected products were distributed to vendors in informal settlement areas. The pharmaceutical company and waste disposal company involved acted swiftly to improve security on and around the site.

Conclusion

This outbreak highlights possible consequences of the unsatisfactory situation in South Africa with regard to hazardous waste control. A comprehensive waste management policy and effective legislation were outlined by Von Schirnding and Ehrlich.[5] Had substances more toxic than dextromethorphan been involved in this incident, a disastrous outcome would have been unavoidable. This study supports calls for an integrated national waste management policy and waste control act to govern the management of waste from generation to disposal.

We acknowledge the help of Mr L. Bremer, Mr S. Ngcatshe and colleagues from the Khanya office in conducting the survey. We also thank Dr S. A. Fisher for reading and commenting on the manuscript.

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Accepted 6 Oct 1994.