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A MAJOR OUTBREAK OF FOOD POISONING ASSOCIATED WITH
THE CONSUMPTION OF COCKLES (Cardium edule)



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P A Ayres

MAFF, Fisheries Laboratory, Burnham-on-Crouch, CMO 8HA, Essex, UK

SUMMARY

Small outbreaks of gastroenteritis occur from time to time associated with the consumption of oysters and other molluscan shellfish in the United Kingdom. The outbreaks normally involve less than 10 people and in consequence often go unreported but investigations have invariably failed to demonstrate any recognized bacterial or viral pathogen. The present paper reports on a large outbreak of food poisoning following the consumption of cockles (Cardium edule), some of the factors which contributed to it and the investigations which followed. The possible virus aetiology in the outbreak offers further and more substantial evidence than hitherto of the potential risks of virus transmission by shellfish and may throw new light on earlier incidents involving shellfish.

INTRODUCTION

In 1971 a paper was submitted to this committee (Ayres, 1971) reporting investigations into non-specific illness associated with the consumption of molluscan shellfish. The investigations were prompted by an outbreak of gastroenteritis following the consumption of oysters which, in spite of diverse and intensive investigation, yielded no causative agent. Other outbreaks of a similar nature are known to occur sporadically and some have been reported in the literature (Preston, 1968; Gunn and Rowlands, 1969). In each of these incidents where no causal agent was identified the symptoms have closely resembled viral gastroenteritis of a type which has been referred to as the summer diarrhoea-winter vomiting syndrome (Clarke et al., 1972). Bacteriological investigations of commercial bivalve shellfish entering British markets (Ayres, 1975) suggested a possible link between samples yielding relatively high plate counts at 37°C and sources of shellfish known to be associated with this syndrome.

THE DECEMBER 1976 OUTBREAK

During December 1976 34 separate outbreaks of food poisoning were reported with cockles being the common food eaten. In many of the outbreaks cockles had been served as an ingredient of seafood cocktail, largely as a substitute for the more expensive shrimp or prawn cocktail. Cockles are traditionally eaten in public houses and at seaside holiday resorts by the casual visitor and occasional isolated cases of mild illness have been reported. In this instance isolated cases did occur but the major incidents were confined to banquets and social functions where large numbers of people ate similar foods and identification of a common source of food poisoning was relatively straightforward. The total number of people at risk in the reported outbreaks was 1757 and of these 809 (46%) were known to have been ill. In 5 of the 18 incidents involving more than 10 people the food-specific attack rate exceeded 90%. Symptoms included nausea, vomiting, diarrhoea, aching limbs, and fever some 24-36 hours after the food was eaten. In some cases this persisted for up to 48 hours and there was some evidence to suggest that people who were ill after eating cockles subsequently transmitted the infection to others who had not eaten them.

INVESTIGATIONS OF CAUSES

Initial investigations by the Public Health Laboratory Service failed to reveal any known bacterial or viral pathogens in either suspect cockles or in faecal samples from those affected. Owing to complex marketing patterns it proved impossible to trace all batches of the suspected cockles to source, but the majority of incidents were found to be associated with cockles from Leigh-on-Sea, a fishing port in the Thames Estuary. Many of the cockle beds in this area are subject to control under an order made by the City of London Port Health Authority under the Public Health (Shellfish) Regulations, 1934. Under the terms of the order, cockles taken from the area may be sold to the public only after approved treatment, in this case contact with flowing steam for six minutes. This procedure was carried out in simple retorts each holding two half-bushel baskets of cockles.

In recent years the traditional hand-raking method of harvesting cockles has been replaced by the introduction of hydraulic suction dredging. This resulted in increased landings of cockles, so placing a considerable burden on the laborious and simple method of retort cooking. In 1975 some producers introduced new processing machinery, the so-called

'Monobloc' cooker. This consisted of a long, rotating, inclined cylindrical steam jacket fitted with an internal screw which caused cockles to pass through it continuously. Although these machines increased throughput, cockles were retained in steam for only two minutes treatment; this resulted in effective shucking (shell removal) but inadequate cooking. However because of the general design and principle of operation of the 'Monobloc' cooker it was not possible to modify the machine to obtain an extended treatment period to overcome this problem.

The polluted areas covered by the order are relatively sheltered and close to the processing site, and in times of adverse weather fishing is usually diverted from offshore (and often sublittoral) cockle stocks to the beds inshore. Subsequent investigations suggest that the Leigh cockles implicated in the food poisoning outbreaks were fished from these inshore areas.

The outbreaks coincided with a high incidence of winter vomiting/summer diarrhoea disease (WV/SD) in some of the local communities and it is probable that the agent causing this syndrome was present in the sewage which contaminated the area fished for cockles. Bacteriological tests subsequently made on raw cockles from the suspect areas showed high levels of faecal contamination (E. coli up to 350/g cockle tissue) and if a viral agent were present in the sewage, it seems likely that it would be similarly ingested and concentrated by the cockles. Unless cockles fished from such an area receive adequate cooking followed by hygienic handling there is a clear risk that microorganisms will survive and be transmitted to the consumer.

The absence of any bacterial pathogen, and the circumstances, pointed strongly to a viral aetiology and further tests were implemented. A re-examination of faecal samples, deep frozen since the outbreak, was undertaken by the Virus Reference Laboratory of the Public Health Service in London. Direct electron microscopy of faecal extracts was inconclusive but examination of fractions from caesium chloride gradients revealed particles similar to those observed in outbreaks of winter vomiting and non-bacterial gastroenteritis by Appleton *et al.* (1977). These small round particles, 25-26 μm in size, were identified in 17 of 20 faecal samples examined, but cockle samples proved negative (Appleton and Pereira, 1977).

The cockle processing methods used at Leigh were investigated in detail at each of the eight processing plants. The steam retort cooking method removed E. coli and coliforms within a minute, but even after

eight minutes treatment did not markedly reduce the numbers of other bacteria, as demonstrated by total plate counts, particularly at 37°C. To obtain better heat penetration direct immersion of whole cockles into boiling water for periods between one and eight minutes was also tried. Total plate counts of bacteria from cockles treated in this manner exhibited substantial reductions in number which were correlated with the length of the time of immersion. However, cooking for longer than six minutes produced a tough almost inedible final product with a very poor yield which was commercially unacceptable.

To ensure adequate bacterial reduction and to reduce problems of contamination during handling, a procedure was finally adopted to give the best possible heat treatment (while still maintaining yield and texture) and to limit handling of the cooked product. This consisted of shell removal (shucking) of the live cockles by brief heat treatment (1-1½ minutes in live steam or boiling water), riddling to remove shells, rinsing to remove sand and shell fragments and a final boiling (pasteurization) of the meats for four minutes. This has produced a marketable product which satisfies the requirements of the consumer, the producer and the health authorities.

CONCLUSIONS

This incident appears to support the view that polluted bivalve shellfish, in this case cockles, may transmit viral gastroenteritis. Diverse factors such as changes in the pattern of consumption, harvesting from polluted waters, disease patterns in local communities, inadequate heat processing and a multitude of minor deficiencies illustrate how such problems can arise and may throw some light on earlier, unexplained outbreaks of 'non-specific' illness associated with the consumption of shellfish. Clearly too, the effect of heat processing on the survival of virus in shellfish needs to be pursued in the knowledge that bacteriological tests may be less than adequate to demonstrate the potential risks involved.

REFERENCES

- APPLETON, H., BUCKLEY, M., THOM, B. T., COTTON, J. L. and HENDERSON, S., 1977. Virus-like particles in winter vomiting disease. *Lancet*, Feb. 19, 409-411.
- APPLETON, H. and PEREIRA, M. S., 1977. A possible virus aetiology in outbreaks of food-poisoning from cockles. *Lancet*, April 9, 780-781.

- AYRES, P. A., 1971. Non-specific illness associated with the consumption of molluscan shellfish; a report of current investigations in England. ICES C.M. 1971/K:17, 6 pp. (mimeo).
- AYRES, P. A., 1975. The quantitative bacteriology of some commercial bivalve shellfish entering British markets. J. Hyg., Camb., 74, 431-440.
- CLARKE, S. K. R., COOK, G. T., EGGLESTONE, S. I., HALL, T. S., MILLER, D. L., REED, S. E., RUBENSTEIN, D., SMITH, A. J. and TYRRELL, D. J. A., 1972. A virus from epidemic vomiting disease. Br. Med. J., iii, 86.
- GUNN, A. D. G. and ROWLANDS, D. F., 1969. A confined outbreak of food poisoning, which an epidemiological exercise attributed to oysters. Med. Offr., 122, 75-79.
- PRESTON, F. S., 1968. An outbreak of gastroenteritis in aircrew. Aerospace Medicine, 39, 519.