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Faecal excretion of entero-pathogens in a Pakistani family returning to the U.K. after a visit to Rawalpindi

By R. W. S. HARVEY* and T. H. PRICE

Regional Public Health Laboratory, University Hospital of Wales, Heath Park, Cardiff CF4 4XW

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SUMMARY

The family consisted of two parents and five children. While the father remained in Cardiff, the mother and all the children visited Rawalpindi, Pakistan, for 6 weeks to stay with relatives. Travel was by flight from Heathrow airport to Pakistan and by a short road journey to Rawalpindi. Mrs M. – the mother – as a guest, did no cooking on the holiday. The house which they were living in had a piped water supply, thought to be treated. There was no flush toilet but a commode was available and was emptied daily. All the children had gastro-enteritis symptoms for 2–3 days after arrival. Ru M. – a daughter – had the most severe illness and was treated by a local doctor. Diarrhoea in the three girls persisted on return to U.K. A faecal swab from Ru M. showed her to be excreting *S. typhi* (degraded Vi phage type). She was admitted to hospital. Faecal samples from the remaining members of the family were taken and examined for entero-pathogens. The father, Fa. M., who had not left Cardiff, had negative stools and remained free from infection. All other family members were excreting one or more entero-pathogens, including a *Campylobacter* sp., three types of *Sh. flexneri* and one type of *Sh. boydii*. A subsequent faecal sample revealed that one of the male children, A.M., was excreting *S. typhi* phage type B2. The two typhoid infections were apparently unconnected.

The media used for microbiological diagnosis in this incident are discussed and contrasted with those employed for routine Salmonella examination of environmental samples. The advantages of selenite F in clinical diagnosis are noted.

Antibiotic therapy was used for both typhoid cases but was not employed for the Shigella infections. The clinical condition of those involved in this incident might well have failed to arouse suspicion and the question arises whether food handlers returning from holiday in tropical and subtropical areas should have bacteriological investigations before going back to their employment.

INTRODUCTION

The family consisted of seven persons. The father and mother were Fa. M. and Su. M., aged 41 and 30. The children were three girls, Ru. M., Ra. M. and Sa. M., and two boys, J.M. and A.M. The father, Fa. M, has lived 20 years in the U.K.,

* Present address: 24 South Road, Sully, Near Penarth, South Glamorgan, CF6 2TG.

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the mother, Su. M., for 8 years. All children were born in Cardiff and the family live in the city in a terraced house which is in reasonable repair.

While Fa. M. remained in this country, Mrs M. and the five children visited Rawalpindi, as a guest of Mr M.'s family, from 2 September 1979 to 14 October 1979. The journey was from Heathrow airport, London, with transfer by car to Rawalpindi on arrival in Pakistan. The car travel took 30 min.

The 6-week visit did not include long journeys from home and they did not travel by rail. No cooking was done by Mrs M. as she was a guest. The home was clean and in good repair, with tiled floors and walls in the kitchen. The water supply was piped and was thought to be treated. There was no flush toilet but a commode was available that was emptied daily.

All the children had symptoms of gastro-enteritis for 2–3 days after arrival. Ru. M.'s illness was the most severe and she passed blood in her stools. She was treated by a local practitioner with some white medicine. On return to U.K. the three girls had some diarrhoea. In Ru. M.'s case this persisted and a faecal swab submitted to a hospital laboratory on 17 October was cultured and *S. typhi* – a degraded Vi phage type – was isolated. Ru. M. was admitted to hospital on 22 October and was discharged on 24 November. The family was visited by an Officer of the Environmental Health Department, faecal samples were obtained, and these were submitted to the Regional Public Health Laboratory, Cardiff.

MATERIALS AND METHODS

Faecal samples were provided by all members of the family. One blood specimen was obtained from A.M., aged 5, with difficulty. A second venepuncture was not attempted. A Widal test was performed on the blood sample and the clot was cultured. Faeces were plated directly on to a Campylobacter medium (Skirrow, 1977). These plates were incubated for 48 h at 43 °C in an atmosphere of 15% CO_2 and 85% H_2. They were examined for suspicious colonies at 24 and 48 h. Salmonellas and shigellas were searched for by direct plating onto brilliant green MacConkey agar, deoxycholate citrate agar and bismuth sulphite agar (Harvey & Price, 1974). Selenite F broth sterilized by Seitz filtration was used for salmonella enrichment. Selenite broth prepared in this way can sometimes aid shigella isolation (Price, 1976). Direct plated selective agars were incubated for 24–48 h at 37 °C and examined for suspicious colonies which were investigated biochemically and serologically. Enrichment cultures were incubated at 37 °C for 24 h and were subcultured to brilliant green MacConkey, deoxycholate citrate agar and bismuth sulphite agar. These plates were incubated at 37 °C for 24–48 h and examined, as before, for suspicious colonies.

RESULTS

Faecal samples from the family contacts of Ru. M. were first examined on 24 October. Between this date and 18 December – the day the last excretor, A.M., became negative – stool specimens were cultured on ten or more occasions. All

Table 1. *Stool isolations with dates, October–December* 1979

Organism and type	Su. M., age 30	Ru. M., age 7	J.M., age 6	A.M., age 5	Ra. M., age 3	Sa. M., age 1½
Sh. boydii, 8	—	—	6. xi.+ 19. xi.+	—	—	5. xi.+ 12. xi.+
Campylobacter sp.	24. x.+	—	—	—	—	—
Sh. flexneri 1 b	24. x.+ 7. xi.+	—	24. x.+	24. x.+	—	—
Sh. flexneri 4 a	—	—	5. xi.+ 7. xi.+	—	—	—
Sh. flexneri 6	—	—	—	—	24. x.+ 19. xi.+	—
S. typhi, degraded Vi strain	—	17. x.+	—	—	—	—
S. typhi B2	—	—	—	5. xii.+ 12. xii.+	—	—
Stools consistently negative from	12. xi. 79	20. xi. 79	21. xi. 79	18. xii. 79	21. xi. 79	14. xi. 79

Where several isolations of the same strain were made, dates of first and last cultures are given.

Table 2. *Sensitivity patterns of enteropathogens isolated*

Organism	*Sh. boydii*	*Sh. flexneri*			*S. typhi*	
Type	8	1 b	4 a	6	Degraded	B2
Tetracycline	SR	SR	S	R	S	S
Co-trimoxazole	SR	SR	S	R	S	S
Sulphonamide	SR	SR	S	R	S	S
Amoxycillin	S	S	S	S	S	S
Cephradine	S	S	S	S	S	S
Gentamycin	S	S	S	S	S	S
Tobramycin	S	S	S	S	S	S
Carbenicillin	S	S	S	S	S	S
Neomycin	S	S	S	S	S	S
Ampicillin	ND	ND	ND	ND	S	S
Penicillin	ND	ND	ND	ND	R	S
Chloramphenicol	ND	ND	ND	ND	S	S

S = Sensitive; R = resistant; SR = some strains sensitive some resistant; ND = not tested.

tests on Fa. M., who had not left the U.K., were negative. Every other member of the family was shown to be excreting a pathogen associated with gastro-enteritis. One isolation of a *Campylobacter* sp. was made. Three serotypes of *Sh. flexneri* and one serotype of *Sh. boydii* were cultured. On 5 November, 20 days from the date of diagnosing typhoid in Ru. M., *S. typhi* phage type B2 was isolated from a faecal sample submitted by A.M. The strain of *S. typhi* obtained from Ru. M. was a degraded Vi phage type. The types are unconnected and it would appear that Ru. M. did not infect her brother. Twelve single colonies of *S. typhi* were picked from a subsequent positive culture from A.M. All 12 were reported as phage type B2 by the Division of Enteric Pathogens Colindale. No further positive stools were available from Ru. M. for the same procedure to be followed. A Widal test was

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negative on A.M. taken on 10 October, 5 days after the initial isolation of *S. typhi* from a stool. Positive faecal results and the dates when each member of the family first ceased to excrete any intestinal pathogens are recorded in Table 1. Antibiotic sensitivity patterns of the strains of *S. typhi* and the shigellas are presented in Table 2.

DISCUSSION

In a public health laboratory, two types of sample may be received for Salmonella diagnosis – clinical and environmental. We prefer Rappaport's magnesium chloride malachite green enrichment (Rappaport, Konforti & Navon, 1956) for environmental specimens, but a few serotypes, notably *S. typhi* and *S. dublin*, are poorly isolated by this medium (Harvey & Price, 1975). To avoid missing the occasional case of typhoid, clinical samples are always investigated using selenite F sterilized by filtration and not by heat (Harvey & Price, 1974). Another reason for using selenite F broth is its ability to act as an enrichment medium for some members of the shigella group. Avoidance of heat sterilization is relevant to this property (Price, 1976). In the current incident *Sh. flexneri* type 6 grew well in the selenite broth. Wilson and Blair's bismuth sulphite agar is not included in our routine plating media for salmonella diagnosis unless, as in this case, the possibility of typhoid infection arises. We use de Loureiro's (1942) modification, which gives very consistent results. Brilliant green MacConkey agar (Harvey, 1956) is our preferred plating medium for salmonella diagnosis, and with the strength of brilliant green used (1/30000) it is suitable for typhoid diagnosis. In this incident it performed as well as the bismuth sulphite agar.

If the possibility of multiple infections had not been considered much information might have been lost. Fortunately deoxycholate citrate agar was included in the battery of plating media and the strain of Campylobacter was isolated by our normal faecal routine. Recovery of six different entero-pathogens in this family episode arouses a suspicion that a vehicle of infection such as a sewage-contaminated water supply may have been involved.

The negative Widal reaction on 10 November and the examination of two stool samples with negative results for *S. typhi* before its isolation from a specimen taken from A.M. on 5 November suggests that he was not infected simultaneously with his sister Ru. M. The lack of correspondence of phage-types of the two typhoid infections supports this view. It would also seem that Ru. M. was not responsible for her brother's infection as a secondary case.

While the two typhoid infections were treated with specific therapy, the cases of shigellosis were not. In this we followed the advice of Christie (1974), who recorded the rapid development of resistance by shigellas to drugs used against them. This may occur during the course of treatment of one patient. We record in Table 2 contrasting patterns of sensitivity for *Sh. boydii* 8 and *Sh. flexneri* 1b.

This is the first time we have investigated a family incident of multiple entero-pathogen excretion but it is unlikely to be unique in persons visiting or re-visiting the Indian subcontinent. In this study we were initially concerned with the diagnosis of typhoid fever, and had no search been made for other entero-pathogens

the infections of only two members of the family would have been discovered. The clinical symptoms of all members of the group, with the exception of Ru. M., were not serious and without microbiological examination the true situation would not have been revealed. The symptoms of A.M. at the time of diagnosis of typhoid were certainly not severe. Mere inquiry as to diarrhoea might not have drawn attention to the need for bacteriological examination if the index case of typhoid fever (Ru. M) had not been recognized. It is accepted that many imported enteric infections come from eastern countries and travel to tropical and subtropical areas. Should selective microbiological examination of food handlers be considered when they return from holidays abroad? We know of one large food firm with their own laboratory that finds such examination useful. A recent review of policies in the U.K. to ensure that a food factory does not distribute food-poisoning micro-organisms also suggests the need for *selective* stool testing as contrasted with examination of faecal samples on a *routine* basis (Howie, 1979).

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