STUDIES ON URINARY CARRIAGE OF ENTERIC GROUP ORGANISMS

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[Continued from page 197, March issue]

PART THREE

SUMMARY AND CONCLUSIONS

SUMMARY
A study of 24 Egyptian male foodhandlers who were passing enteric group organisms in their urine has been made and certain control tests have been carried out. Findings were as follows:

Classification
Urinary excretors of enteric group organisms may be classified as:
Chronic persistent carriers.
Chronic intermittent carriers.
Transient carriers.

Incidence
Ten of the first group were studied. The incidence of chronic persistent carriers among the population from which they were derived appears to be between 0.16 and 0.5 per cent. The incidence of the two other groups must remain a matter of speculation owing to the high element of chance in their detection. It may lie in the range between 0.13 and 0.65 per cent. for chronic intermittent carriers. A total carrier incidence of 1 to 3 per cent. is suggested.

Regularity of Excretion
Chronic persistent carriers pass organism very regularly in their urine. 382 (93 per cent.) of 411 specimens examined by culture were positive. Specimens per individual ranged from 11 to 73 and positives among them from 66 per cent. of 29 to 100 per cent. of 56. The highest number of consecutive negatives
was three. Two or more consecutive negatives by all methods used were only observed four times, though occurring eight times among direct plate cultures.

Only one of the chronic intermittent carriers studied showed a high proportion of positive culture—52 (66 per cent.) of 78 carried out. Others yielded infrequent positive cultures.

**Numbers Passed**

The numbers of organisms present in the urine of chronic persistent carriers ranged from a few (one colony on plating a loop of the specimen) to 30,000,000 per ml. Of 35 viable counts made on the ten chronic carriers, 18 (from six of them) gave a figure of over a million per ml. The lowest viable count was 700 per ml.

**Schistosomiasis**

There is a high and probably significant positive correlation between the chronic urinary carriage of enteric group organisms and urinary schistosomiasis. Eight of the ten persistent carriers studied showed the presence of ova of *S. hematobium* in their urine, seven of them on first examinations; 82 (45.3 per cent.) of 181 examinations on all persistent chronic carriers were positive. Three intermittent chronic carriers yielded 24 (29.3 per cent.) positive specimens—none of these were first examination specimens. The number of positive first examinations on 676 foodhandlers was 89 (13.2 per cent.); from this an incidence of 29 per cent. in the unselected population was inferred. A sample of a similar population showed an incidence of 40 per cent. on repeated examination. Of the examinations on the last group, 17.9 per cent. in all, and 47 per cent. of those from the proven schistosomiasis cases, were positive.

**Urinary Antibodies**

Antibodies to the flagellar antigen of the infecting species were generally found at a titre of 1/2 or over in the urine of chronic persistent carriers who had been inoculated against enteric. They were also commonly noted when 1/4 was the lowest dilution tested, the comparative figures for ten carriers being 84/100 (84 per cent.) examinations positive on testing at 1/2 dilution, and 86/166 (52 per cent.) at 1/4 dilution. Eight consecutive negative tests were, however, observed when the 1/2 dilution was omitted, while only three consecutive negative tests were noted when the test was carried out at this dilution. Antibodies to other enteric species were much less frequently noted and were generally of lower titre. Titres of both homologous and heterologous urinary antibodies were compared with serum titre to the same antigens. Antibodies were also found in the urine of chronic intermittent carriers. They were generally of low titre only, but when the test was carried out in dilutions rising from 1/2 they were more often found than were organisms during periods when passage of the latter was infrequent.
Urinary antibodies were observed in 6.1 per cent. of the control population. There was a positive correlation between their presence and that of schistosoma ova. Their possible source is discussed.

Three carriers were detected, though routine cultures were negative, by extra cultures undertaken because urinary antibodies were present.

CONCLUSIONS

The high incidence of chronic urinary carriage of enteric organisms among male Egyptian foodhandlers is due to a high rate of infection in a population largely infested with Schistosoma haematobium. Schistosomiasis probably causes chronicity, perhaps by providing vesical foci for local invasion by the organism.

Chronic persistent carriers can generally be detected by simple culture of a single specimen. If two specimens are examined the chance of such carriers evading detection is very small.

Intermittent carriers cannot be detected with certainty by the culture of any number of specimens which it is practicable to examine in routine work. Our results suggest that, while culture of three specimens might lead to the discovery of 20 to 80 per cent. of chronic intermittent carriers, over 40 per cent. might escape detection even were eight culture tests made. Such infrequent excretors, however, present a relatively small risk. Transient carriers can only be detected by chance.

Urinary antibody excretion is also associated with schistosomiasis. The antibodies are present in the blood passed in the urine, but may perhaps also be locally produced in the lesions.

The demonstration of antibodies in urine may be of value in carrier detection:

(a) As an additional method to culture. This affords little or no advantage in the detection of persistent carriers, but the chance of detecting intermittent carriers is enhanced if more intensive investigation is made when antibodies are found in culture-negative urine.

(b) As a screening test to limit the number of specimens which need be sent from a distance to a fully equipped laboratory. If specimens for culture are restricted to those from persons who have passed urinary antibodies on one or more of three occasions it is unlikely that a persistent carrier will be missed, and, with more intensive follow-up as above, the chance of detecting an intermittent carrier should not be less than were three specimens cultured primarily.

(c) As the sole test for exclusion from employment in isolated localities from which transmission of specimens to a laboratory presents difficulty. If all who pass urinary antibodies on one or more of three occasions are excluded from employment as foodhandlers, about 7–15 per cent. of those applying for such work (depending on climatic and other factors influencing urine concentration—the latter figure was found here recently during hot weather) may be rejected. These will include the great majority of such carriers as would be detectable were a full examination possible.
ACKNOWLEDGMENTS

We wish to thank our colleagues on the laboratory staff and especially Major G. R. E. Naylor, Major A. W. Morrow, Pte. A. A. Mousley and Sergt. G. A. Pepin for the help they have given us in performing the many tests involved and for valuable advice. Our thanks are also due to administrative officers, medical and non-medical, who have made arrangements which permitted the follow-up of the carriers; to Major-General A. J. Beveridge, O.B.E., M.C., D.M.S. M.E.L.F., and Surgeon Commander W. Sloan Miller, R.N., for their helpful criticism; and to Major-General Beveridge also for permission to publish our findings.

REFERENCES

CHADWICK, P. (1951). In the press.

CORRIGENDA

The following corrections should be made in the previous article in this series, "Studies on Urinary Carriage of Enteric Organisms—1. Quantitative Evaluation of methods for the Concentration of Enteric Group Organisms in Urine" (this Journal, Vol. XCV, No. 6, page 341):

Page 342, line 7: For "in urine carrier" read "in urine of carrier."
Page 343, line 37: For "medium used from" read "medium used for."
Page 349, line 36: For "2 or 3" read "2 of 3."
Page 351, line 22: For "tested in" read "tested on."
  line 38: For "1.0 ml. molten agar" read "1.0 ml. in molten agar."
Page 352, line 4: For "20 to 24" read "20 to 40."
Page 353, line 35: For "field culture" read "fluid culture."