

# THE PREVALENCE OF CARRIERS AMONG RECOVERED TYPHOID PATIENTS

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A REVIEW of the literature shows findings of from 0.5 per cent to 11.6 per cent of permanent carriers among recovered typhoid patients. The lowest finding is that of Conradi<sup>1</sup> in 1907 on the basis of 400 cases and the highest is that of Semple and Greig<sup>2</sup> in 1908 based on the examination of a group of 86 recovered typhoid patients in an army hospital in India. The examinations by Semple and Greig were made daily until the stools were repeatedly negative. Gay<sup>3</sup> states that the results of Semple and Greig represent more nearly the true state of affairs. Other surveys give figures ranging between these extremes. The most generally accepted estimate of permanent typhoid carriers is about 5 per cent of the total number of recovered cases. The following quotation from Chapin<sup>4</sup> expresses his opinion with regard to the generally accepted typhoid carrier percentage: "There is little doubt that the percentage of carriers, both convalescent and chronic, is considerably larger

than is indicated by the above figures." The figures to which he refers are those of Ledingham (2.47 per cent), Park (2 per cent) and Bruckner (5.2 per cent).

TABLE I  
DISTRIBUTION ACCORDING TO RACE, SEX AND AGE OF PERSONS EXAMINED AND THOSE FOUND POSITIVE FOR TYPHOID BACILLI

Age Group	EXAMINED					CARRIERS				
	White		Colored		Tot.	White		Colored		Tot.
	M.	F.	M.	F.		M.	F.	M.	F.	
0-4	1	0	1	0	2	0	0	0	0	0
5-9	5	5	5	6	21	1	1	0	1	3
10-14	14	4	6	8	32	2	1	0	0	3
15-19	7	6	8	16	37	1	0	0	2	3
20-29	6	5	7	14	32	0	1	1	0	2
30-39	7	5	3	3	18	0	1	0	0	1
40-49	3	4	2	0	9	1	0	1	0	2
50-59	3	0	0	2	5	1	0	0	1	2
Total	46	29	32	49	156	6	4	2	4	16

Typhoid in Alabama is primarily a problem of the small rural community and our material was obtained from residents of these small country towns. Our data are based on the findings obtained from the examination of 156 individuals who were reported to the State Board of Health as having typhoid fever from 6 months to 2 years previous to examination. The specimens obtained for

TABLE II  
RESULTS OF POSITIVE TYPHOID CARRIER EXAMINATIONS

Age	Race	Sex	Date of Disease	Date of Pos. Exams.	Interval	No. of Exams.	Urine or Feces
9	W	M	Aug., '24	4-17-25	8 mos.	2	Urine
46	W	M	Aug., '24	4-17-25	8 mos.	2	Urine
16	W	M	Aug., '24	{ 4-17-25	8 mos. }	2	Feces
38	W	F	Aug., '24	4-17-25	8 mos.	2	Feces
16	C	F	Aug., '24	5-11-25	9 mos.	1	Feces
6	C	F	Aug., '24	5-11-25	9 mos.	1	Feces
12	W	M	Oct., '24	5-18-25	7 mos.	1	Feces
24	W	F	July, '24	5-18-25	10 mos.	1	Urine
21	C	M	Feb., '23	6-5-25	28 mos.	1	Urine
13	W	F	June, '24	6-5-25	12 mos.	1	Feces
50	C	F	Aug., '23	7-3-25	11 mos.	1	Feces
58	W	M	Oct., '24	6-5-25	8 mos.	2	Feces
10	W	M	Aug., '25	6-5-25	10 mos.	2	Feces
9	W	F	May, '24	{ 6-5-25	13 mos. }	2	Feces
42	C	M	1923	{ 7-24-25	14 mos. }	1	Urine
16	C	F	1923	7-15-25	Over 12 mos.	1	Urine
				7-15-25	Over 12 mos.	1	Urine

examination were secured through solicitation from health officers and private physicians in various sections of the state. Practically all sections of the state are represented in the series.

The bacteriological technic used was that described in connection with a survey of the dairy population for healthy carriers by Welch, Dehler and Havens.<sup>5</sup>

It is seen from the two tables that 16 carriers were found in the examination of 156 persons, a percentage of 10.3. A further point brought out by this study is the fact that 9 of the carriers were under 20 years of age.

It is of interest to note that 6 of the 16 carriers excreted bacilli in the urine. This emphasizes the importance of urine cultures in a search for carriers, a procedure which was stressed in a description of the results of a previous study.<sup>5</sup> Of the 16 carriers, 6 (3.8 per cent) were urinary and 10 (6.4 per cent) fecal.

It is interesting to note that the carriers discovered were equally divided between the two sexes. This is not in accordance with reports of previous investigators. Most of the literature on carriers states that female carriers occur more frequently than male, about 4 to 1.

An additional observation of interest in the course of the survey was the isolation of paratyphoid A from the stools of 4 of the subjects in whom a diagnosis of typhoid was made the previous year.

These 4 paratyphoid A cases are not included in this study.

In the light of past experience in connection with typhoid carriers in the United States, the results of our examinations would seem unusually high. In view of the much larger number of positive findings in this series it was considered advisable to obtain confirmation of the cultures isolated from the carriers. Through the courtesy of Major H. J. Nichols, a majority of the cultures were sent to the Army Medical School for confirmation. All cultures submitted were reported as typical typhoid bacilli, culturally and serologically.

#### SUMMARY

In the examination of 156 individuals who had recovered from typhoid fever within from 6 months to 2 years, 10.3 per cent were found to be typhoid carriers. These results show a percentage distinctly higher than reported by previous investigators in the United States.

#### REFERENCES

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