

TUBERCULOSIS SURVEY OF ASIATIC, COLOURED AND BANTU SCHOOL CHILDREN IN JOHANNESBURG

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Aims of the Project

1. To carry out tuberculin testing on all Asiatic, Coloured and Bantu school children in Johannesburg.
2. To X-ray chests of all positive reactors under 10 years of age.
3. To X-ray chests of all children over 10 years of age.
4. To administer BCG to all negative reactors.
5. To refer cases discovered in the survey for treatment.
6. To X-ray all adult home contacts of cases discovered; and tuberculin test all child home contacts and X-ray those found tuberculin-positive.
7. To X-ray all adult home contacts of positive tuberculin reactors; and tuberculin test all child home contacts and X-ray those found tuberculin-positive.

Material and Methods

We used the standard Heaf tuberculin test.

The 10-year dividing line could not be accurately followed in all cases. The age was sometimes not accurately known, and children were assessed more by size than age. Some children, therefore, though over 10 years of age, were not X-rayed on the 70 mm. unit, but Heaf tested and referred for a 100 mm. plate only if found to be positive.

The Heaf testing and X-raying with the 70 mm. unit were done on the same day. One week later, the Heaf tests were read. At the same time, the negative reactors were given BCG, 0.1 ml. intradermally (Glaxo-Allenbury freeze-dried vaccine).

Eight weeks later the BCG-vaccinated children were again Heaf tested, and one week after this the results of this test were read.

TABLE I. TUBERCULIN TESTING

	No. of pupils	Heafs read			Total Heafs read	No. of positive reactors			Percentage positive reactors			Total positive reactors	Percentage positive reactors
		2-6	7-12	13+		2-6	7-12	13+	2-6	7-12	13+		
Asiatic ..	5,464	162	3,390	1,253	4,805	15	668	557	9.25	19.70	44.45	1,240	25.8
Coloured ..	10,553	568	6,223	1,972	8,763	113	2,109	1,200	19.89	33.89	60.85	3,422	40.2
Bantu ..	5,716	28	2,563	1,883	4,474	2	1,383	1,361	*	53.96	72.27	2,746	61.2

*Unreliable.

TABLE II. X-RAY SURVEY

Total X-rayed	70 mm. (over 10 years)					100 mm. (Heaf-pos. 6-10 years)					Total X-rayed	Percentage notified	
	No. referred	Cases notified	Healed tubs.	Other path.	Percentage notified	Total X-rayed	Cases notified	Healed tubs.	Other path.	Percentage notified			
Asiatic	3,643	37	2	4	1	0.05	174	12	31	—	6.89	3,816	0.36
Coloured	5,416	54	3	4	1	0.05	510	31	75	1	6.07	5,926	0.57
Bantu	4,256	21	5	4	—	0.11	128	30	25	1	23.43	4,384	0.79

TABLE III. X-RAY OF CONTACTS OF TUBERCULIN-POSITIVE CHILDREN

	Total X-rayed	No. of cases	Healed tubs.	Other path.	Percentage of cases (active disease)	Total percentage of cases (healed + active disease)
Asiatic ..	234	7	21	3	2.99	11.96
Coloured ..	190	9	17	2	4.73	13.68
Bantu ..	123	7	19	2	5.69	21.13

TABLE IV. BCG VACCINATION: CONVERSION RATE

	No. given BCG	No. of post-BCG Heaf tests done	No. of post-BCG Heaf tests read	Conversions	Negative reactors	Percentage conversions
Asiatic ..	2,767	2,364	2,231	2,229	2	99.91
Coloured ..	3,205	1,317	1,301	1,292	9	99.30
Bantu ..	1,537	949	891	890	1	99.88

TABLE V. BCG VACCINATION: COMPLICATIONS

	No. given BCG	Ulcers	Glands	Secondary infection	Percentage incidence of complications
Asiatic ..	2,767	2	Nil	3	0.18
Coloured ..	3,205	Nil	Nil	2	0.06
Bantu ..	1,537	Nil	Nil	4	0.45

TABLE VI. COMPARISON WITH NOTIFICATION OF CASES OF TUBERCULOSIS IN 1961

	Cases notified in 1961 (including deaths and hospital cases)			Cases notified as a result of survey		
	6-9	10-18	Total	6-9	10-18	Total
Asiatic ..	12	7	19	12	2	14
Coloured ..	17	8	25	30	5	35
Bantu ..	203	150	353	31	3	34

COMMENTS ON RESULTS

(a) Results of Tuberculin Testing

The highest number of positive reactors was found in the Bantu and the least in the Asiatics, with the Coloured in between.

As is to be expected, the percentage of positive reactors in the 3 age groups rose with increasing age. This is shown by the histogram in Fig. 1.

(b) Percentage of Tuberculotics among Positive Tuberculin Reactors

The number of cases found was 7-12 times higher in the 6-10 year age group (tuberculin-positive) than in the 10-plus (random) group.

One naturally expects to find more cases in tuberculin-positive reactors than in the general population, but the difference found is far greater than was expected. The discrepancy is probably accounted for by two factors. viz.:

The results of tuberculin testing and BCG vaccination were recorded under the age groups 2-6, 7-12, and 13 and over.

All Asiatic and Coloured schools in Johannesburg are included in the survey, but only 15 Bantu schools, because the survey came to a premature end owing to the lack of BCG and the fact that the SANTA X-ray vans were needed elsewhere.

The 70 mm. films were read by SANTA's consultant radiologist and cases referred were X-rayed on a 100 mm. film. These and other 100 mm. films were read by tuberculosis medical officers.

Letters were sent to families of cases discovered and to families of positive reactors requesting them to report to the nearest tuberculosis clinic for investigation. Adults were X-rayed, while children were Heaf tested and X-rayed if the reaction was positive.

Results

The results are set out in Tables I-V.

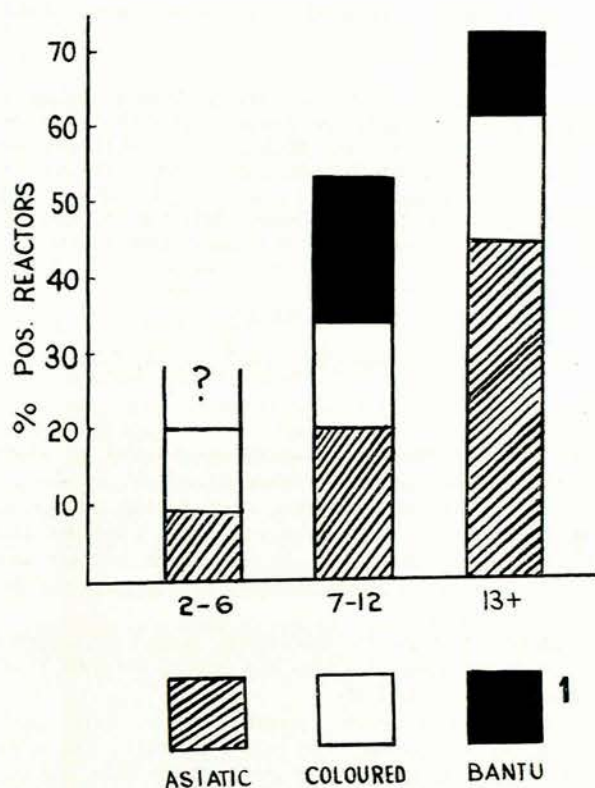


Fig. 1. Results of tuberculin testing

1. The fact that the 6-10 group was X-rayed on a 100 mm. film, while the 10+ group was X-rayed on a 70 mm. film.
2. The fact that the plates were read by different people, which of course introduces another variable. Hilar shadows reported as suspicious or abnormal may well have been within normal limits, but were reported because the reader knew the case to be tuberculin-positive.

It appears that X-raying with the 70 mm. film is less reliable than X-raying with the 100 mm. film, and the difference becomes more marked when the subjects are children.

(c) Contacts of Tuberculin-positive Children

The response of relatives and other contacts was not good, but as a result of the survey at least 23 contacts have been notified and put on to treatment, one with a large cavity (and no complaints or clinical illness whatever) having been hospitalized.

Not all the contacts who were investigated, however, are reflected in the figures in Table III, for separate records were not kept at each clinic of all children who were Heaf tested, etc., as a result of this survey. Many old, 'unable to trace' cases were also brought to light again as a result of the finding of positive tuberculin reactors at school.

(d) Conversion Rates after BCG

Table IV shows the excellent conversion rate encountered. This was highly gratifying and compares well with other surveys. It was noted that the Heaf test after BCG vaccination is only weakly positive, and never 3 or 4+ positive, as is often found with natural exposure and infection.

(e) Complication Rates

These are shown in Table V. Very few were encountered—only a few small ulcers, no glands whatever, and a few cases with secondary infection probably due to scratching. The low incidence of complications is probably the result of the very careful technique employed. The injection was always given as superficially as possible.

At one Coloured school, however, one of the Heaf guns jammed and, as a result of this, BCG was given to some children who were in fact tuberculin-positive. In these cases, there was an accelerated reaction at the BCG site, which doubtless would have gone on to ulceration; but INH was given prophylactically to these cases for 2 months, and there were no ill-effects. This incident does, however, draw attention to the greater safety that is possible when a 20-needle Heaf gun is used to give the BCG (percutaneous method) than when the intradermal route is used. With the percutaneous method ulceration is not encountered, even in tuberculin-positive reactors. The percutaneous method is also much easier and less time-consuming, and will, we hope, be used in future campaigns.

It will be seen from Table VI that among the Coloured slightly more cases were notified as a result of the survey than in one year by the usual methods of case finding. The figures for Bantu are obviously not comparable, because only a few schools were included in the survey. Unfortunately no population figures are available to work out the incidence rate in 1961—the last census statistics available are for 1951, and are divided into the age groups 0-10 and 10-20 years.

DISCUSSION

This survey serves to establish the extent of tuberculosis among non-White school children in Johannesburg. It also raises the question of case finding in those already BCG-vaccinated, for a number of children will still contract tuberculosis despite adequate BCG vaccination (as evidenced by tuberculin conversion).

Obviously, the tuberculin test, a most valuable diagnostic tool, must lose much of its value as a result of BCG vaccination. This means that a larger number of children will have to be X-rayed to exclude active tuberculosis than would have been the case had BCG not been given.

To minimize the harmful effects of irradiation, it is essential that when children are X-rayed they should wear a suitable apron to protect the gonads. Certainly, at the very least, children with strongly positive Heaf reactions must be X-rayed, because this finding would indicate that they have undergone natural exposure to infection.

SUMMARY

1. 21,733 non-White school children in Johannesburg were tuberculin tested and all of them except tuberculin-negative children under 10 years old were X-rayed.

2. Negative reactors were given freeze-dried BCG by the intradermal route. The conversion rate was high and the complication rate very low.

3. An attempt was made at investigating the contacts of positive reactors.

4. Case finding as affected by BCG vaccination is discussed.

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