

Incidence of Tuberculosis in the Schoolchildren of the Umzimkulu District

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SUMMARY

During an 18-month period a study was undertaken among the schoolgoing children of an entirely rural population, to obtain an impression of the average incidence of tuberculosis measured in terms of the Heaf-reactions.

At the same time the value of INH prophylaxis was tested by means of the same method.

S. Afr. Med. J., 48, 2348 (1974).

Since the end of 1972 a mobile team guided by a Public Health nurse has visited 32 schools in the Umzimkulu district. These 32 schools were selected on the map and are evenly situated throughout the whole district. At 5 of these schools there is also a high school. The total number of schools in the district amounts to 105. Since the biggest schools were selected, these 32 were regarded as being fairly representative of the entire school population in the district.

The total number of children tested was 11 119, of whom 9 782 were in the primary schools and 1 337 in the high schools.

The routine followed was the same for all schools, as follows:

- 1st visit: Orientation: introduction to teachers.
- 2nd visit: Health education: Parent-Teacher-Team meeting.
- 3rd visit: Vaccination: Heaf testing and polio drops.
- 4th visit: Documentation: reading Heaf and BCG neg. reactors.
- 5th visit: Medication: INH distribution to liaison officer.
- 6th visit: Continuation: subsequent distribution and collection of registers.
- 7th visit: Revisitation: visit for new arrivals with Heaf test and BCG.
- 8th visit: Administration: reading tests, etc.
- 9th visit: Evaluation: retesting of last year's children.
- 10th visit: Meditation: reading results.

This scheme was carried out with the following objectives in mind:

1. To introduce health principles in a community at a point of interest common to all involved (children, teachers and parents).
2. To give health education to the younger generation by using experimental methods like health songs, etc.
3. (a) To analyse the incidence of tuberculin sensitivity

of all schoolgoing children; (b) to analyse the effect of INH treatment on the Heaf reaction.

4. To identify other needs at the school pertaining to health, such as sanitation, feeding schemes, school gardens, etc.

5. To give prophylactic treatment to the children, including polio, smallpox and BCG.

In order to obtain the co-operation of all the schools we circularised details of our project via the circuit inspector of the schools, and stressed to everyone our dependence on their co-operation for making it work. In this review we will deal only with the third objective, this being the analysis of the tuberculin sensitivity of the schoolgoing children and the effect of INH on it.

GENERAL REMARKS

A few general remarks have to be made before discussing the results. To run a scheme as outlined above, it is mandatory to have a motivated and dedicated team which keeps an accurate administration of each child, and the administrative system involved is rather elaborate and time-consuming. Only part of the year is available for visits since the holidays and examinations do interfere from time to time. Careful planning of the route and daily programme has to be made to make each trip worth while.

The material used for testing was obtained from the Health stores in Umtata, and could not be tested for potency or quality. The method of testing was by the multipuncture method of Heaf, using human PPD tuberculin. Very few children of those tested did receive BCG at birth or at clinics, and the Heaf grades were classified from 1 to 4 in the standard way.

INH was given to all Heaf +2 reactors and higher grades according to weight. At each school a liaison officer was selected, who was made responsible for daily issuing of tablets and the administration of them. The ages in each standard vary considerably, but in general age and standards seem to correlate. It seems that in the district nearly all the children do go to school, even if quite a few do not complete all standards. Only human PPD tuberculin was used and false positives due to the Avian tuberculosis organism were disregarded for the purpose of this study.

RESULTS OF THE HEAF TESTING

For each standard of every school the number of children was calculated as a percentage of the total on the roll.

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TABLE I. HEAF GRADES TABULATED AS A PERCENTAGE OF THE TOTAL NUMBER OF CHILDREN TESTED AND AVERAGES WORKED OUT PER STANDARD FOR ALL SCHOOLS COMBINED

Standards	Number treated	% attendance	Heaf grades (%)				% Neg.	Number of schools
			1	2	3	4		
Sub A	2 300	75	15	7	5	3	66	32
B	1 387	76	15	10	8	3	62	30
Std I	1 507	78	17	10	8	4	59	30
II	1 215	81	17	12	10	4	58	31
III	1 095	85	19	15	10	3	52	31
IV	864	85	21	14	11	4	47	29
V	778	88	20	13	12	8	48	26
VI	636	93	21	15	15	6	42	23
	9 782							
Form I	715	84	21	14	31	9	24	4
II	310	83	16	21	39	14	10	4
III	183	91	13	14	46	13	12	3
IV	105	73	8	9	39	9	36	1
V	24	83	8	29	50	4	8	1
	1 337							
Total	11 119							

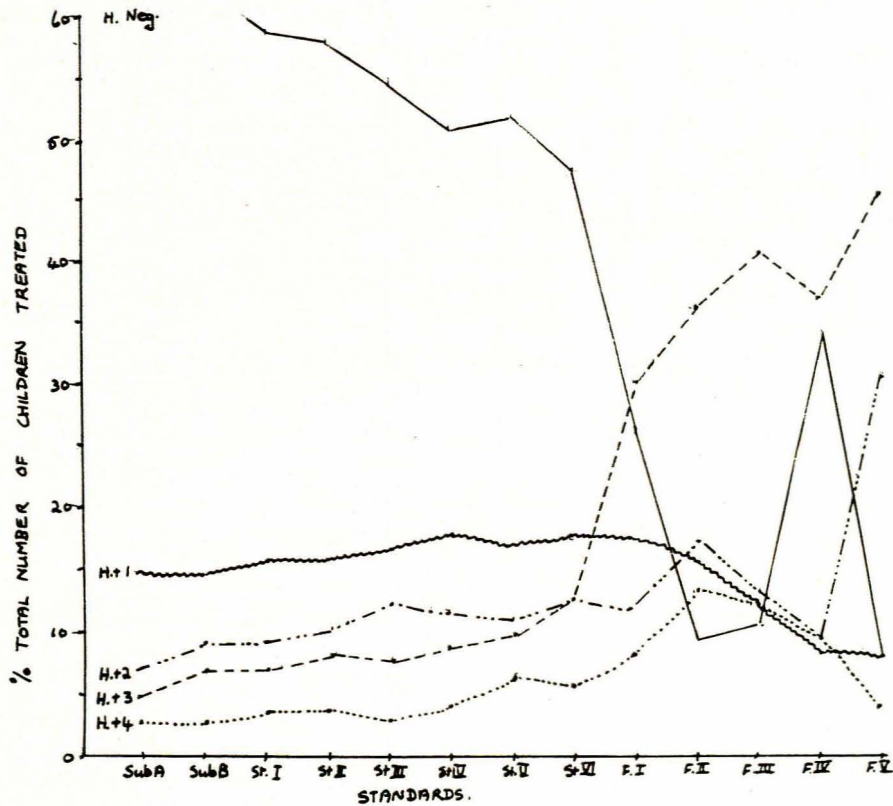


Fig. 1. Heaf profile.

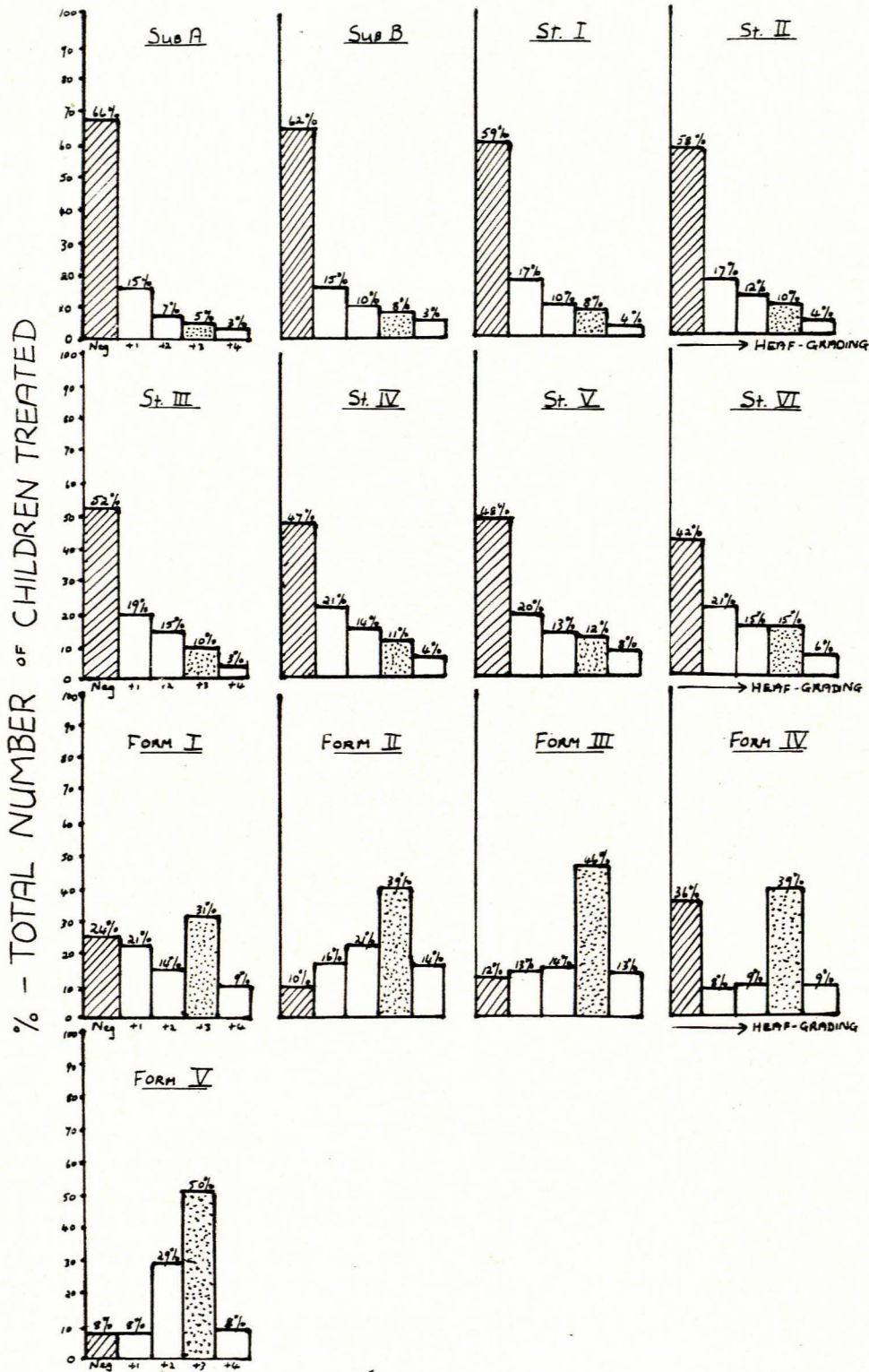


Fig. 2. Relative Heaf percentages per standard.

Absentees at the Heaf-testing or Heaf-reading day were counted together. The average for all schools together was worked out per standard and proved to be surprisingly high. As expected, the attendances in the higher standards were better than in the lower standards, but the average never dropped below 75%.

One of the conclusions which we drew from this relatively high figure was that health education had come across and that the co-operation of all parties involved had been obtained.

The Heaf grades 1, 2, 3 and 4 were tabulated as a percentage of the total number of children treated in that standard, and from all the schools together average percentages were worked out (Table I). The same procedure was followed for the Heaf negative reactors. Only those standards where the Heaf negative percentage was 100% were excluded, because this was indicative of errors such as unsuitable material, incorrect technique or unco-operative children. It became obvious that a certain batch of material had to be blamed for these failures, but they were few and did not affect the project as a whole.

From the figures obtained in this way it can be seen that the highest negative reactors percentage was found in substandard A (66%) and dropped progressively to 8% in the matric class, with only one exception representing only one school with 105 children.

The Heaf grades 1 and 2 do increase initially but drop again to low in favour of the grades 3 and 4, reaching a peak of 50% in the matric class (Fig. 1).

The above patterns, as illustrated in the histograms, seem to favour the conclusion that most of the children seem to develop their sensitivity to tuberculin during their schoolgoing period and particularly at the junction from the primary to the secondary schools (Fig. 2).

One could attribute the lowering of resistance in these fast-growing and therefore relatively malnourished children to the fact that they had reached puberty.

The high incidence on the other side of positive Heafs in all standards confirms the suspicion that for a great number of children the change from a lower grade to a higher grade, or even to clinical forms of tuberculosis, is a matter of a precarious balance in which nutrition seems to play a vital role.

Giving BCG protection to all negative reactors could be of great use in helping the child to fight the attack of the mycobacterium on his health, but only when supported by adequate nutrition can the BCG protection and other positive reactors be expected to overcome the infection.

EFFECT OF THE USE OF INH ON THE HEAF REACTION

This effect was measured by comparing Heaf grades before and after a year's treatment with INH in prophylactic dosages. This dosage was 100 mg for children up to 12 years and 200 mg for those above 12 years. The tablets were given at the school by the teachers, and a register was kept for each child. For the purpose of this analysis 4 primary schools and 1 high school were selected, and the results are given in Table II.

TABLE II. EFFECT OF THE USE OF INH ON THE HEAF REACTION

	Treatment			Heaf grading		
	Number children treated	Number children traced	% Traced	Relative percentages		
				Down	Same	Up
Primary school						
A	131	94	72	30	56	14
B	272	169	62	53	39	8
C	107	66	65	49	47	5
D	30	21	70	36	45	24
Secondary school						
E	190	101	53	28	43	30
Total	730	451				
Average percentages of Heaf changes			62%	39%	46%	16%

From the 730 children on treatment in these 5 schools only 451 could be traced, representing only 62%, and the combined result for all 5 schools shows that 39% had a lower Heaf grade afterwards, 46% remained the same and 16% increased during the treatment. Only a few of the 39% became Heaf negative during that period.

Since there are many factors which can suppress a Heaf reaction temporarily (measles, whooping cough, malnutrition) and to me no reason is known which can do the opposite—the figure of 39% may be unrealistic.

CONCLUSION

The results obtained are very unreliable since there are too many factors involved, but the figures as such do suggest that in terms of Heaf grade changes the use of INH prophylaxis seems to be of relatively little value.

The main objection, however, which could be raised against the use of drugs on such a large scale as a prophylactic, comes from the principle of health education. How can a health system be built on the continuous use of drugs, especially in the case of disease which is relatively mildly infectious? Apart from the fact that most of the teachers soon become tired of giving the tablets every day, and that the children do not like them, should our health education not be based on healthy living having effective nutrition as its foundation?

In conclusion I should like to postulate that in an area where tuberculosis is an endemic disease, represented by the high sensitivity rate to tuberculin, it is of paramount importance to concentrate, in our fight against tuberculosis and other crippling diseases, on nutrition theoretically, by giving practical health education and nutrition courses, and by encouraging the use of milk and stimulating the reintroduction of feeding-schemes at all schools.

Together with BCG given to all negative reactors in the district, this might well prove fatal to the life of the *Mycobacterium tuberculosis* and might be a constructive attempt to improve the standard of health.