MASS TREATMENT OF TRACHOMA: FIELD TRIALS OF DIFFERENT DRUGS IN 10,033 BANTU CHILDREN*

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The areas selected for the field trials were (*a*) Potgietersrust, (*b*) Hammanskraal and (*c*) Jane Furse Hospital, Sekukuniland. All lie in South Africa north of Pretoria, where it is known that the incidence of trachoma varied from 20 to 100% among the Bantu. Ten ophthalmic specialists examined 10,033 children at 36 Native schools and instituted mass treatment with a variety of donated ophthalmic ointments. The work was carried out with the active support of the Bureau for the Prevention of Blindness and under the patronage of the South African National Council for the Blind.

Type of Trachoma

Eye disease was not present at birth but was evident about 3 months of age and the incidence was at its peak from the age of 1 to 4 years. The disease was follicular in type till 4 years, often complicated by secondary bacterial infection. In schoolchildren papillary hypertrophy was the main feature although a few follicles and some degree of scarring were frequently seen. Secondary infection at school was clinically rare, being 5% compared with 75% among babies. The natural decrease in incidence with age is illustrated in the graph (Fig. 1); those remaining uncured are the potential blind of the future.

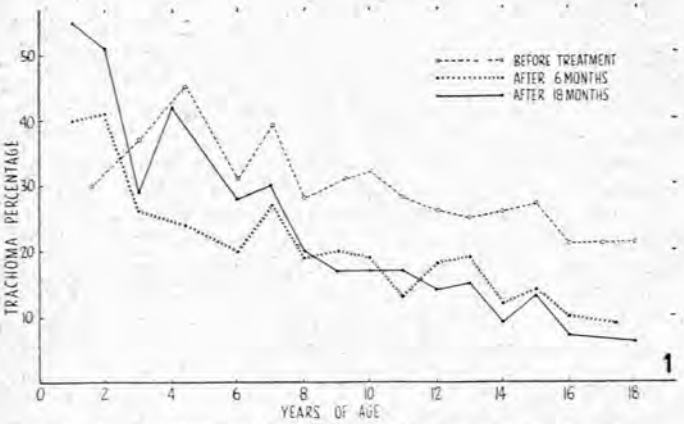

Fig. 1. Trachoma index in 10,033 Bantu children by age.

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Differential Diagnosis

In the field we depended on naked-eye or loupe examination of the everted upper lid because pannus was difficult to see against the brown iris without a slit lamp, which was not used during these trials. In babies, if follicles were obscured by inflammatory swelling, we tended to diagnose simple conjunctivitis, but where follicles were visible trachoma was the diagnosis, which undoubtedly included some cases of follicular conjunctivitis. In some scholars when trachoma was quiet, with the minimum of papillary hypertrophy, we were in doubt between the diagnosis of allergic conjunctivitis, spring catarrh, and trachoma. If in fact trachoma becomes an auto-immune disease after the initial viral infection, the end-results would be similar to those of an oft-recurring allergic conjuntivitis. Scrapings from such doubtful cases examined by Amies *et al.*[1] showed a proportion with inclusion-bodies and the eosinophils of spring catarrh were notably rare. It is therefore probable that the majority of doubtful cases were trachoma. In practice, each doctor formed his own opinion and tried to stick to the same standard of diagnosis throughout the trials. However, as statisticians well know, allowance must be made for human frailty.

Secondary Infection

During the trials 170 smears and cultures were examined. Koch-Weeks bacillus was present in 50% of the smears, whereas on culture the predominant organisms were found the following number of times:

Diphtheroids including *Bacillus xerosis*	54
Koch-Weeks bacillus	23
Haemolytic *Staphylococcus aureus*	21
Staphylococcus aureus	18
Staphylococcus albus	16
Staphylococcus citreus	9
Streptococcus viridans	18
Friedlander bacillus	16
Pneumococcus	14
Streptococcus	8
Gram-negative coccus	5
Haemophylus influenzae	5
Other organisms	16

Each organism was tested for sensitivity to the particular drug in use and, with few exceptions, all were sensitive. This work was carried out by Mr. Roux, of the South African Institute of Medical Research, and Dr. W. Lewin.

TABLE I. RESULTS OF TREATMENT

Doctor and schools	Tr./total in 6-12 age-groups before treatment	% Tr. before	% after 6 mths.	% after 18 mths.	Drug used	Made by
N. L. Murray						
Hamburg	31/59	50	14	9	Crystapen	Glaxo
Teneriffe	63/90	70	19	13	Achromycin	Lederle
Wisconsin	51/75	68	39	33	Sulphacetamide	Boots
Scirappes	102/150	67	16	12	Achromycin	Lederle
J. Swartz						
Kaffirboom	20/81	25	25	21	Achromycin	Lederle
Nkidikitlana	30/94	32	42	38	Sodium sulamyd	Scherag
Ruigtevlei	14/37	38	50	36	Neo-delta cortef	Upjohn
Taute Swala	48/80	60	47	42	Chloromycetin	Parke Davis
H. J. Hamelberg						
Galakwinstroom	19/63	30	20	19	Terramycin	Pfizer
Jakalskuil	17/56	30	14	24	Myciguent	Upjohn
Basterpad	24/40	60	19	16	Sodium sulamyd	Scherag
Leyden	50/136	37	17	31	Achromycin	Lederle
G. Frampton						
Bakenberg Primary	137/314	43	30	23	Achromycin	Lederle
Bakenberg Secondary	over 12 yrs.	14	11	9	Achromycin	Lederle
Helderfontein	20/100	20	7	6	Crystapen	Glaxo
E. T. Meyer						
Mortwasethula	35/244	14	9	5*	Sulphacetamide	Evans
Mashashane	21/186	11	18	12*	Neobacrin	Glaxo
Mogwadi	15/74	20	14	5	Achromycin	Lederle
R. A. Trope						
Letjatji	63/147	43	60	55	Sulphacetamide	Evans
Molapo	19/79	24	53	42	Achromycin	Lederle
Batuang	36/75	48	48	31	Achromycin in oil	Lederle
Magatle	72/139	51	50	55	Neomycin	Boots
E. Epstein						
Matome	35/49	71	10	16	Polycycline†	Bristol
Madika	77/117	65	33	25	Sulphacetamide	Boots
Mamati	23/56	41	20	26	Achromycin in oil	Lederle
Rakgwatha	24/131	18	7	23	Polycycline†	Bristol
J. G. Scott						
Magnet Heights	49/160	30	13	13	Supronalum	Bayer
Schoonoort	27/98	27	7	11	Hydro andresan S	Organon
Pokwani	44/165	27	9	13	Achromycin in oil	Lederle
E. Franks						
Temba	33/363	9	5	4	Brolene	May Baker
Serota and Kekane	36/300	12	11	10	Achromycin	Lederle
Laka	53/213	24	21	18	Myciguent	Upjohn
W. J. Levy						
Leeukraal	41/105	39	23	21	Achromycin in oil	Lederle
Diplopye	37/132	28	27	19	Achromycin in oil	Lederle
Ramushiya	82/333	25	8	14	Neomycin	Boots
Mogogelo	22/76	29	27	26	Metimyd	Scherag
Totals	1470/4727	31%	21%	22%		

* Schools (and ointments) amalgamated after 6 months.
† Manufacture discontinued: other drugs used after 1st year.

Treatment

With a few exceptions each school had its own brand of ointment throughout the trial. The school principal was shown by the Bureau workers the correct way to put ointment into an eye and he then intructed his pupils how to do it to one another. Following the work of Scott and Taylor[2] and of the World Health Organization,[3] all scholars were treated twice a day for 3 successive days each month for 18 months.

A social worker from the Bureau visited the schools at intervals to bring fresh ointment when required. The results are given in Table I; it should be noted that treatment was still being done at the times of re-examination.

Control Groups

Two schools were examined but were not treated. At one of these Mafefe, outside the area of the trials, the index changed from 23% to 27% after a year. At the other, Garagapola, near the Jane Furse Hospital, the index fell from 28% to 24% in the same period, but the impression was gained that the incidence and severity of trachoma had decreased over the past 7 years in the area served by that hospital and its 9 scattered clinics. This impression was supported by the finding in the same area of only 70% trachoma in an isolated school, Npanoama, near Sekwati's kraal, where 90% had been diagnosed by Amies, Murray, Scott and Warren[4] in 1952. A third school was treated with a dummy ointment with only slight change and this has been analysed by Dr. A. M. Adelstein.

Discussion of Results

As treatment was left in the hands of the school principal, it is not surprising that results varied with their thoroughness. The total results were made up of some schools with 70% improvement and some with none. For comparison between

schools, the younger scholars were grouped together to avoid errors from the age-variation factor. There was a total drop in incidence from 31% to 21% in 6 months with no further improvement in the following year. A drop from 31% to 21% means that 10 out of 31 trachoma cases were cured, which equals a 32% improvement among the infected cases. The lack of further improvement probably resulted from 3 factors, viz. (1) a falling off in interest once some improvement was achieved, (2) the influx of untreated scholars coming for the first time to school, and (3), to a lesser extent, reinfection amongst treated scholars. It is thought that the 3-day treatment is a minimum and that it should be extended to 5 days. It is interesting that improvement followed the use not only of antibiotics such as penicillin, the cycline group and chloramphenicol but also of sulphonamides and a simple chemical such as propamidine, which is the active agent in Brolene.

The view was expressed some years ago[5] that trachoma was a mild disease in the absence of secondary infection. However, if a drug can combat the trachoma virus as well as bacterial infection, results will be correspondingly better. Laboratory work will soon confirm field trials on the question of which drugs are best. When cortisone, hydrocortisone or prednisolone was added to sulphacetamide or to neomycin ointment the results in mass treatment were much the same as without them, but the steroids plus an anti-trachoma drug may well have a place in the treatment of individual cases.

Prevention

It is thought that babies get their first infection by contact, e.g. from the mother wiping their eyes with an infected rag or from flies, and that, while grannies, mothers, or even cattle* may be the source, the most probable reservoir of infection is a sibling in the active, early stage of the disease. Every effort therefore has been made to encourage treatment of *all* babies in the home to prevent or cure the disease. In this we have so far failed, owing to apathy and ignorance on the part of the peoples and to lack of home visitors on the part of the Bureau.

If an effective vaccine can be developed, the possibilities of eliminating this world-wide disease will be enhanced.

* Experimental inoculation of a calf with the cultured virus gave a negative result.

CONCLUSIONS

There is no doubt that the incidence of trachoma can be lowered among school children by the use of suitable drugs and thus the numbers of blind diminished in the future. The following conclusions have therefore been reached:

1. That all schools in affected areas should be given mass treatment twice a day for 5 consecutive days in each month for 6 months.

2. That uncured cases should continue treatment thereafter on an individual basis.

3. That each new intake of scholars should follow the same pattern.

4. That Native field workers should be appointed to supervise this work under medical guidance and to visit all homes to encourage self-treatment in younger children, particularly in the homes of uncured scholars.

The cost will be amply repaid, not only by future saving on blind pensions and by the increased labour force for the market, but also by the enhanced status of the country; because, as the late Jan Hofmeyr said, 'One of the most effective tests of the standard of a nation's civilization is the provision it makes for the weak and helpless in its midst.'

REFERENCES

1. Amies, C. R., Loewenthal, L. J. A., Murray, N. L. and Scott, J. G. (1953): S. Afr. Med. J., 27, 593.
2. Scott, J. G. and Taylor, I. B. (1957): Med. Proc., 3, 247.
3. Wld Hlth Org.: In press.
4. Amies, C. R., Murray, N. L., Scott, J. G. and Warren, R. St. H. (1952): S. Afr. Med. J., 26, 362.
5. Scott, J. G. (1945): Brit. J. Ophthal., 29, 244.