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Endemic Treponematoses in the Sudan

A Report on a Survey*

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It has been recognized for many years that Africa contains a very large reservoir of endemic treponematoses, and all information on the foci of infection contributes to the goal of elimination of these diseases as public health problems.

In 1959 the author undertook, at the request of the Sudanese Government, a number of pilot surveys in areas where the endemic treponematoses were thought to be prevalent. From the information acquired in these surveys and from official data it is clear that yaws and endemic syphilis are a major problem of public health in the Sudan. It is estimated that some 5 million people in six provinces are at risk, and that about 20 % of the population in an area of 1 543 000 km² suffer from one or the other of the two diseases in the active clinical stage.

In some localities yaws was found to be prevalent, and in some endemic syphilis. In others, the two infections were seen to co-exist; and it is suggested that, since little is known of the extent to which one infection confers protection against the other, the situation in the Sudan provides a perhaps unique opportunity for scientific studies of the interrelationship of these two diseases and their possible relationship with venereal syphilis.

Another interesting finding, worthy of further investigation, was that mucous lesions occurred only in areas where syphilis was present and not where yaws alone was prevalent.

At the Second International Yaws Conference (1957) it was pointed out that the African continent had the largest reservoir of endemic treponematoses in the world, with an estimated 25 million cases of yaws. In addition, endemic syphilis prevailed in several areas. Any action to explore and determine the foci of endemic treponematoses in these areas and to reduce this reservoir of infection is therefore an important step towards the goal of elimination of endemic treponematoses as a public health problem in the world as a whole (Guthe & Willcox, 1954).

Sudan is one of the countries in this region where endemic treponematoses still exist. While the nature of yaws and the problem of venereal syphilis have, for a long time, been appreciated in the Sudan, the significance of the non-venereal endemic treponematoses, including their exact extent, was not completely known. The medical facilities have been steadily improving since Sudan gained independence but have not yet advanced to the point where complete statistical information for the many health problems, particularly those affecting the rural population, is available.

In 1959 at the request of the Sudanese Government and on behalf of the World Health Organization, the author undertook a visit to those areas of the Sudan where endemic treponematoses were thought to be highly prevalent in an effort to assess the importance of the problem. In view of the limited time and personnel available, it was not possible to attempt any precise prevalence survey, and the report that follows should therefore not be construed as a definitive statistical statement on the situation but rather as a practical basis for further work.

AVAILABLE DATA ON TREPONEMATOSES IN THE SUDAN

The official reports of the Ministry of Health for the years 1955-56 and 1956-57 give figures for yaws

* This study was carried out during the author's assignment to the Sudan in 1959 as Medical Consultant to the Eastern Mediterranean Regional Office of the World Health Organization.

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and syphilis for the whole of the Sudan by provinces (Table 1). According to these figures, there were 146 718 treponemal infections (yaws and syphilis) in the whole country in 1955-56 and 207 784 for the period 1956-57. These figures represent new cases diagnosed and treated among out-patients in the hospitals, dispensaries and dressing stations in rural areas. This means that in only a two-year period 354 502 new treponemal infections were diagnosed in a population of some 11 million. This corresponds to an annual incidence of 1611 per 100 000 population and well illustrates the magnitude of this national public health problem.

For a variety of reasons these figures are probably not exact. First, there is, as a rule, a tendency to over-diagnosis of yaws and syphilis by the rural health units. Secondly, the number of falsely diagnosed cases is, in fact, probably smaller than the actual number of cases with clinical manifestations or in latency, owing to the fact that only a relatively small sector in the rural population is covered by medical facilities. Thirdly, under-reporting by the health services must also be assumed to take place.

The figures for new cases of treponemal infections among out-patients for the years 1957-58 and 1958-59 (incomplete) show more or less the same pattern (Table 2).

According to these data, 171 839 new out-patients were reported as having treponemal infections in the period 1957-58 and 164 504 (122 685 cases of syphilis and 41 819 of yaws) in the period 1958-59.

TABLE 1

NEW CASES OF TREPONEMAL INFECTIONS AMONG OUT-PATIENTS IN THE SUDAN FOR THE PERIODS 1955-56 AND 1956-57

Province	1955-56		1956-57	
	Syphilis	Yaws	Syphilis	Yaws
Bahr el Ghazal	5 174	8 508	9 022	15 000
Blue Nile	17 215	—	17 706	—
Darfur	31 660	—	38 700	—
Equatoria	3 841	13 770	17 436	14 938
Kassala	7 170	—	9 044	—
Khartoum	8 165	—	11 187	28
Kordofan	22 545	—	26 112	—
Northern	3 976	—	22 009	—
Upper Nile	13 515	11 209	13 771	12 831
Total	113 231	33 487	164 987	42 797

TABLE 2

NEW CASES OF TREPONEMAL INFECTIONS AMONG OUT-PATIENTS IN THE SUDAN FOR THE PERIODS 1957-58 AND 1958-59

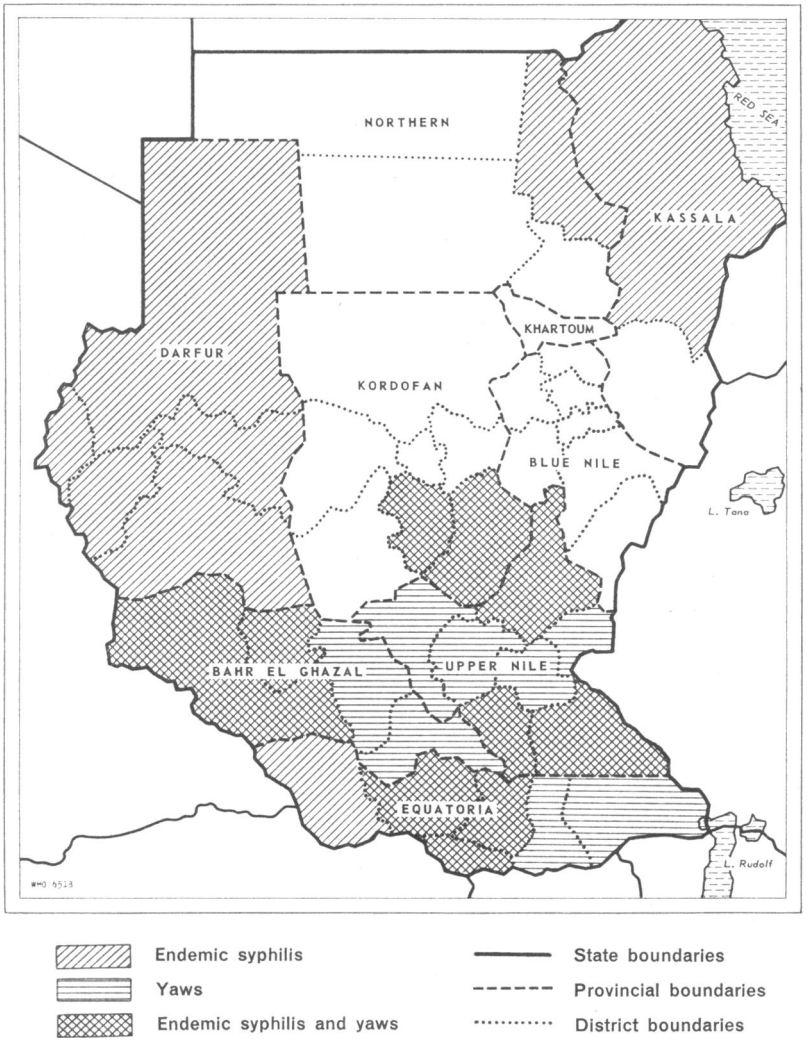
Province	1 July 1957-30 June 1958		1 July 1958-30 June 1959	
	Syphilis	Yaws	Syphilis	Yaws
Bahr el Ghazal	8 364	12 316	7 315	8 897
Blue Nile [a]	17 561	1	—	—
Darfur	40 146	1	40 145	0
Equatoria	7 825	4 334	12 089	17 696
Kassala	12 680	1	8 246	
Khartoum [a]	8 991	0	—	—
Kordofan	28 118	5	26 482	26
Northern	4 429	0	3 543	2
Upper Nile	13 866	13 201	24 865	15 196
Total	141 980	29 859	122 685	41 819

[a] Incomplete data.

The available statistical data vary to some extent from year to year, but nevertheless indicate large persistent foci of yaws, syphilis or both in certain areas. This situation is illustrated in Fig. 1, which has been prepared on the basis of the available data and of information gained in pilot surveys in the field carried out during the writer's recent visit to the Sudan.

The epidemiological aspect of treponemal infections, particularly their non-venereal endemicity, has not so far been sufficiently emphasized as regards the Sudan. This is particularly true in respect of syphilis infections, which have been considered so far mostly from the aspect of venereal spread. However, detailed data from the provinces contain clear evidence of the widespread existence of non-venereal endemic yaws and syphilis in children. The data from the three districts of Nasir–Eastern-Nuer, Akobo–Lau-Nuer and Pibor, in the Upper Nile Province, for the year 1958-59 (shown in Tables 3-4) demonstrate this. It is evident from these tables that of the new cases of syphilis and yaws seen in out-patients at various dispensaries, a large proportion is in children with treponemal infections of an endemic, non-venereal nature.

FIG. 1
DISTRIBUTION OF ENDEMIC TREPONEMATOSES IN THE SUDAN



The diagnosis in children is based on clinical manifestations only. The significance of these figures is therefore obvious, and there must be a very high percentage of seroreactivity among the population. This was confirmed in the pilot surveys carried out by the present author in different areas of endemic treponematoses in the Sudan. But, on the basis of the official figures alone, it is evident that syphilis and yaws, as endemic treponemal infections, are a public health problem of considerable magnitude in different areas of the Sudan.

PILOT FIELD SURVEYS

A number of surveys were carried out on the basis of household and family censuses of the whole population, and were undertaken in villages in different areas of the country in the provinces of Equatoria, Upper Nile, Kassala and Kordofan.[1]

[1] I was assisted in these surveys by Dr Zein A. Ibrahim, Chief, Tuberculosis Division, Mnistry of Health, Sudan, whose experience in public health problems was of great value in this work.

TABLE 3
NEW CASES OF YAWS BY AGE-GROUP AMONG OUT-PATIENTS IN THREE DISTRICTS OF UPPER NILE PROVINCE, SUDAN, 1958-59

Dispensary	Adults				Children [a]		Total
	Men		Women				
	No.	%	No.	%	No.	%	
Eastern Nuer District (Nasir)							
Nasir	67	16.7	126	31.3	209	52.0	402
Dago	50	25.9	33	17.1	110	57.0	193
Ulang	187	26.0	213	29.7	318	44.3	718
Sokau	66	24.4	63	23.2	142	52.4	271
Kigille	90	33.2	80	29.5	101	47.3	271
Nasir (Mission)	153	33.5	216	47.3	88	19.2	457
Total	613	26.5	731	31.6	968	41.9	2 312
Lau Nuer District (Akobo)							
Akobo	40	30.1	60	45.1	33	24.8	133
Waat	809	45.4	700	39.2	274	15.4	1 783
Ful Turuk	310	29.5	302	28.8	437	41.7	1 049
Akobo (Mission)	40	29.8	34	25.4	60	44.8	134
Total	1 199	38.7	1 096	35.4	804	25.9	3 099
Pibor District							
Pibor	12	44.4	8	29.6	7	26.0	27
Boma	9	26.5	7	20.6	18	52.9	34
Agoi	372	55.2	202	30.0	100	14.8	674
Pascaalla	28	36.8	29	38.2	19	25.0	76
Gumurviz	18	28.1	27	42.2	19	29.7	64
Pibor (Mission)	7	28.0	8	32.0	10	40.0	25
Total	446	49.6	281	31.2	173	19.2	900

[a] Below 15 years.

The epidemiological and clinical aspects of yaws in the Sudan were studied, particularly in the Eastern part of Equatoria Province. In the Torit district, three villages (Yagi-Yagi, Chakari and Lofi) were systematicaly surveyed as well as a group of the population belonging to the Letuka tribe on the way to Yagi-Yagi village. Examinations were also carried out in two dispensaries (Lirya and Kiyalla) in this area, where advance notice was given to the surrounding population that they should convene for medical examination and treatment.

In the three villages, 212 families with a total of 682 people were surveyed; in the Letuka group 365 people, and in the dispensaries 149 people were examined.

The particulars of this survey are given in Table 5. It is obvious that the surveyed areas are typical active foci of yaws in the " wild " expanding stage of infection. The distribution of active clinical manifestations of yaws among the children—amounting to 43.1% clinical cases diagnosed among all the children examined in Chakari village, or 95.6%

TABLE 4

NEW CASES OF ENDEMIC SYPHILIS BY AGE-GROUP AMONG OUT-PATIENTS IN THREE DISTRICTS OF UPPER NILE PROVINCE, SUDAN, 1958-59

Dispensary	Adults				Children [a]		Total
	Men		Women				
	No.	%	No.	%	No.	%	
Eastern Nuer District (Nasir)							
Nasir	246	30.7	216	26.9	340	42.4	802
Dago	70	47.0	61	40.9	18	12.1	149
Ulang	155	42.8	142	39.2	65	18.0	362
Sokau	189	27.3	156	22.5	348	50.2	693
Kigille	144	37.5	140	36.5	100	26.0	384
Nasir (Mission)	0	0	0	0	0	0	0
Total	804	33.6	715	30.0	871	36.4	2 390
Lau Nuer District (Akobo)							
Akobo	470	40.3	306	26.2	390	33.5	1 166
Waat	200	33.5	170	28.8	227	37.7	597
Ful Turuk	90	41.5	60	27.6	67	30.9	217
Akobo (Mission)	19	48.8	10	25.6	10	25.6	39
Total	779	38.7	546	27.1	694	34.5	2 019
Pibor District							
Pibor	205	54.1	100	26.4	74	19.5	379
Boma	20	33.9	20	33.9	19	32.2	59
Agoi	83	48.0	85	49.1	5	2.9	173
Pascaalla	55	48.7	34	30.1	24	21.2	113
Gumurviz	186	43.9	179	42.2	59	13.9	424
Pibor (Mission)	10	27.0	10	27.0	17	46.0	37
Total	559	47.2	428	36.1	198	16.7	1 185

[a] Below 15 years.

of all early cases—is a classical feature of endemic non-venereal treponematosis where transmission of the infection occurs primarily in childhood. This observation is closely related to the frequency of hyperkeratotic lesions in adults, as shown in Table 4. The prevalence of active clinical yaws in all the three systematically surveyed villages is as high as 54%. This area must therefore be considered holoendemic. In the selected group examined in the dispensary at Lirya active clinical cases were found to have a frequency as high as 73.1%.

Conditions similar to those described above are believed to exist in most rural areas of Bahr el Ghazal and Upper Nile Provinces. However, in the Upper Nile Province there are regions where yaws and endemic syphilis can be found either in separate localities or commingled among the population of the same locality. This was observed, for instance, among the Dinka tribe in Bor district, where yaws in certain areas appears to be in slow regression.

At the dispensary in Mangala, 11 active cases of treponemal infections were observed, six of them

TABLE 5

RESULTS OF SYSTEMATIC SURVEYS OF DIFFERENT POPULATION GROUPS IN TORIT DISTRICT, EQUATORIA PROVINCE, SUDAN

Group	Number surveyed	Clinical active cases of yaws							
		Early		Late		Hyperkeratosis		Total clinical cases	
		No.	%	No.	%	No.	%	No.	%
Chakari village (105 families)									
Men	117	0	0	2	1.7	70	59.8	72	61.5
Women	51	1	2.0	3	5.9	33	64.7	37	72.6
Children	144	22	15.3	7	4.9	33	22.9	62	43.1
Total	312	23	7.4	12	3.8	136	43.6	171	54.8
Lofi village (65 families)									
Men	65	0	0	1	1.5	33	50.8	34	52.3
Women	61	3	4.9	0	0	25	41.0	28	45.9
Children	83	5	6.1	7	8.4	7	8.4	19	22.8
Total	209	8	3.8	8	3.8	65	31.1	81	38.7
Letuka group									
Men	132	17	12.9	12	9.1	48	36.4	77	58.4
Women	144	17	11.8	2	1.4	30	20.8	49	24.0
Children	89	17	19.1	0	0	4	4.5	21	23.6
Total	365	51	15.0	14	3.8	82	22.5	147	40.3
Yagi-Yagi village (42 families)									
Men	42	4	9.5	2	4.8	9	21.4	15	35.7
Women	31	4	12.9	1	3.2	11	35.5	16	51.6
Children	88	24	27.3	0	0	4	4.5	28	31.8
Total	161	32	19.9	3	1.9	24	14.9	59	36.7
Lirya dispensary									
Men	31	0	0	2	6.5	20	64.5	22	71.0
Women	25	1	4.0	0	0	13	52.0	14	56.0
Children	93	26	27.9	0	0	47	50.5	73	78.4
Total	149	27	18.1	2	1.3	80	53.7	109	73.1

being early infectious lesions. From the localization and the appearance of the lesions, three early cases were diagnosed as endemic syphilis (oral mucous plaques and papules in the genital region) and the other three as yaws (typical skin papillomata). Three of the remaining five patients had hyperkeratotic involvement of the soles and two had late lesions, one on the trunk and one on the back. One of these patients, with characteristic plantar hyperkeratosis, was the mother of a child who had the typical mucous lesions of endemic syphilis. One of the cases of endemic syphilis was a young girl who had on her neck a large papillomatous lesion which resembled a mother yaw. Furthermore, she had mucous oral patches with swollen indurated submaxillary lymph-nodes and papillomatous lesions of the genitalia (virgo intacta). Observations of this kind are very unusual and pose a number of interesting clinical and epidemiological problems, showing the need for further investigations.

It was sometimes very difficult on inspection of individuals to decide whether they were suffering from yaws or endemic syphilis. The possibility could not be ignored, taking into account a certain number of cases not unlike that of the above-mentioned girl, that one treponemal infection might be superimposed on the other. This mixture of endemic treponemal infections in one locality and even in one individual represents a scientific challenge.

It is known that yaws and endemic syphilis have many features in common; but, although the clinical and epidemiological differences appear to be rather of a quantitative than of a qualitative nature (Grin, 1936, 1956; Hudson, 1946, 1958), a distinction between them may still be justifiable on ecological and biological grounds (Turner & Hollander, 1947). It could also be shown in the course of this survey that mucous lesions in treponemal infections occur only in regions where syphilis exists and not in areas (e.g., eastern Equatoria) where only yaws is prevalent (Hackett, 1949).

It is obvious that further detailed epidemiological, clinical and experimental investigations on this problem are necessary to clarify the nature of these conditions. In areas in the Sudan where both treponemal infections occur as endemic diseases there is an unique opportunity for acquiring more definite information on the relationship between the two. The gaps in the knowledge of treponemal infections have been pointed out by the WHO Expert Committee on Venereal Infections and Treponematoses on several occasions in the past, as well as by the WHO Scientific Group on Treponematosis Research in 1960.

There is evidence that the problem of the coexistence of the two diseases is acquiring increasing importance in certain regions of the Sudan where yaws has been somewhat reduced in recent years. Table 6 and Fig. 2 have been prepared on the basis

TABLE 6

RATIO OF TREPONEMAL INFECTIONS AMONG OUT-PATIENTS ATTENDING RURAL DISPENSARIES

FIG. 2. MONTHLY INCIDENCE OF YAWS AND ENDEMIC SYPHILIS AMONG OUT-PATIENTS AT RURAL DISPENSARIES IN BOR DISTRICT, UPPER NILE PROVINCE, SUDAN, JULY 1958–JUNE 1959