INCIDENCE OF YAWS AND SYPHILIS IN FIVE RURAL VILLAGES, REPUBLIC OF PANAMA

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INCIDENCE OF YAWS AND SYPHILIS IN FIVE RURAL VILLAGES, REPUBLIC OF PANAMA [1]

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[From the Gorgas Memorial Laboratory, Panama, R. de P.]

This paper is a report of a study of the incidence of yaws and syphilis among the inhabitants of five small towns situated near the junction of the Chagres and Gatuncillo Rivers and about 30 miles by boat and automobile from Panama City. These villages were chosen for survey as being typical rural communities where yaws has been endemic but located near enough to a large city to permit exposure to syphilis. During the course of the survey certain features were presented which merit consideration and they will be discussed. A total of 371 Negro adults and children above 5 years of age were studied. The total population of the five towns is approximately 720.

A history of previous yaws or syphilis infection together with history of the amount of treatment received was recorded for each person. It is considered that a positive history of yaws is usually accurate. A negative history may be given where the primary lesion is insignificant or where the infection occurred so early in childhood that the individual cannot remember and the parents are not at hand to give definite information. A history of syphilis, especially among Negroes, is of most uncertain value.

For the purpose of this survey only those cases have been listed as "probably syphilis" who have given a history of primary lesion on the genitals, two cases of congenital syphilis, one woman whose history was clearly typical, and a girl of 17 who admitted promiscuous intercourse during the past 4 years and who denied having had yaws. The physical examination was directed particularly toward revealing late lesions of syphilis or yaws in the eyes, mouth, throat, teeth, epitrochlear glands, skin, bones, and patellar reflexes. The heart was examined in all those cases with histories of yaws or syphilis and all those whose blood revealed a positive serology. All the cases studied have been classified under the same clinico-serological headings as those employed originally by the Jamaica Yaws Commission in their report for 1932 (1).

[1] Read before the three hundred twenty-ninth meeting of the Medical Association of the Isthmian Canal Zone, held at Gorgas Memorial Laboratory, Apr. 17, 1934.

Table 1 shows the summary of the findings in the different villages. Under the heading of "Yaws" are counted all those with a past history of yaws as well as those who now have evident yaws lesions. Only a few cases of yaws in the early secondary period were observed. The heading of "No history—Positive serology" is self-explanatory. A three-plus reaction in either Wassermann or Kahn test alone has been considered sufficient to list a serology as positive for the purposes of this classification. The heading of "No history—Equivocal serology" needs no explanation. In these cases one of the tests is negative while the other would show one- or two-plus. All cases showing negative Wassermann and a plus-minus reaction by Kahn test are listed as of negative serology.

TABLE I.—*Yaws—Syphilis survey of 5 Chagres River villages*

Villages	Yaws		Probably syphilis		No history—positive serology		No history—equivocal serology		No history—negative serology		Total number examined
	Cases	Percent	Cases	Percent	Cases	Percent	Cases	Percent	Cases	Percent	
Santa Rosa	20	17.3	7	6.0	8	6.9	9	7.8	71	60.8	115
Guayabalito	7	8.4	3	3.6	6	7.2	4	4.8	62	74.6	82
Las Guacas	3	11.1	2	7.4	1	3.7	0	.....	21	77.7	27
Gatuncillo	10	26.3	0	.....	3	7.9	2	5.2	23	60.5	38
Nuevo San Juan	21	19.0	8	7.2	2	1.8	6	5.4	73	66.3	110
Total	61	16.4	20	5.3	20	5.3	21	5.8	250	67.2	372

Actual number examined, 371.

It will be seen from the table that the yaws incidence varies considerably in the five towns—from 8.4 percent to 26.3 percent. Guayabalito (8.4 percent) and Santa Rosa (17.3 percent) are so close together that one steps from one town into the other with less than a hundred yards between the nearest houses. In Santa Rosa the houses are very close together on two sides of a narrow street, while in Guayabalito they are scattered in a haphazard pattern and widely separated from each other along the river bank. Such a spotty distribution of yaws is quite common. Both in Darien and in Haiti it was not unusual to find neighborhoods entirely free from yaws and completely surrounded by other groups of families with a yaws incidence of 60 percent or more. These observations are of interest in bearing out the belief that yaws is principally spread by contact or some mechanical transference of infectious material which is effective only at close range.

The highest yaws incidence, that of 26.3 percent, in Gatuncillo considered together with the absence of syphilis in the same town is of interest. Certainly this group is not large enough to give us reliable information but these findings fit in with the usual relative prevalence of the two diseases in the same locality. Where there

is a high yaws incidence the syphilis index is always very low or negligible. For example, in Haiti syphilis is practically unknown in rural districts; also in the Kenya Colony in Africa where yaws and syphilis clinics have been conducted for a number of years the same observations have been made (2). In the recent Jamaica survey of 1,500 clinic cases (1) the yaws incidence was 61.1 percent and the incidence of "probable syphilis" was 1 percent.

The discrepancy between 372, total number examined which appears on the table, and 371, the actual number examined, is explained by the fact that one man gave typical history of having had both yaws and syphilis. This man was 37 years old, and stated that he had yaws in 1902, and that the mother yaw was on the dorsum of the right foot. A scar on the site of the mother yaw is now present. He stated that in 1912, 10 years later, he contracted gonorrhea, and that a week or two later he had a sore on the penis which was not painful and which healed in 4 to 6 weeks. He received no specific treatment for either infection. His son, a boy 10 years old, has never had yaws, but he now has a three-plus Wassermann, two-plus Kahn, bilateral epitrochlear adenopathy and typical Hutchinson's teeth. Such cases of syphilis infection superimposed under natural conditions on an old untreated yaws infection are extremely rare. The writer has seen but one other case similar to this in a Haitian. In neither of the two cases were both infections actually seen in the same individual; history and what appeared to be old yaws scars were the only evidence obtainable of the earlier yaws infection.

TABLE II.—*Wassermann and Kahn test readings in 46 untreated cases of yaws*

Case no.	W	K	Time elapsed since infection	Case no.	W	K	Time elapsed since infection
			Years				*Years*
344	−	−	60	227	−	−	20
286	+	++	51	332	+	+++	18
300	−	+	50	272	−	+++	18
255	++++	+	50	152	+++	++	14
200	−	++	44	275	−	+	14
371	++++	++	40	5	+	++	13
54	+++	++++	40	23	+++	+++	12
107	−	++++	40	260	++++	+++	12
209	−	−	39	280	−	++	12
134	−	+++	38	287	−	++	12
237	++++	++	38	78	+++	++++	10
239	++++	+	38	56	+	+	9
146	−	−	36	193	−	−	9
312	−	−	36	317	++++	++++	9
80	−	±	34	40	++++	++++	7
10	−	−	34	21	++++	+++	6
278	−	−	33	206	++++	+++	6
29	++++	+++	30	243	++++	+	5
141	+	++++	28	184	+	−	3
91	++++	++++	26	242	++++	+	[1] 2
325	−	−	22	258	++++	++	[1] 6
262	−	+++	18	284	++++	+++	[1] 3–4
259	−	+++	22	342	++++	++++	(?)

[1] Months.

In table II among the 46 unrelated cases of yaws it is interesting to note that 19 of the 33 cases whose yaws infection occurred more than 10 years earlier revealed a negative Wassermann reaction; 8 cases were negative by both Kahn and Wassermann tests, and 11 gave negative Wassermann with varying degrees of positive Kahn reactions. It should be explained that all the serological work for this survey was done by the board of health laboratory, Ancon, and that their reports for Wassermann reactions are made only on a two-plus basis. For the purpose of this report it was thought best to convert these readings to a four-plus basis for easier comparison with the Kahn. Therefore, a laboratory report of two-plus Wassermann is transcribed here as four-plus, a one-plus is shown as three-plus, and a plus-minus reaction as a one-plus. This table is probably a fair demonstration of the relative delicacy of the two tests. Attention is called to case no. 342, who is a man 66 years old and has juxta-articular nodes on both elbows; he denies both yaws and syphilis, and is placed arbitrarily in the yaws group.

TABLE III.—*Wassermann and Kahn test readings in 15 treated cases of yaws*

Case no.	W	K	Time elapsed since infection	Treatment	Case no.	W	K	Time elapsed since infection	Treatment
			Years					*Years*	
106	−	−	38	6 neo.	27	−	++	10	3 neo.
292	+++	++++	30	2 neo.	215	−	−	6	50–100 Carbarsone.
12	−	−	25	12 neo.					
337	−	−	20	3 neo.					
167	−	±	16	9 neo.	369	−	−	6	3 neo.
152	+++	++	14	1 neo.	150	−	±	4	6 neo.
53	−	±	12	16 neo.	2	++++	+++	3	Carbarsone.
24	−	++	10	3 neo.					
52	−	++	10	4 neo.	322	−	−	1	13 neo.

Table III needs no explanation. It is now generally accepted that yaws cases require considerable more treatment than was originally given when salvarsan was first employed. The Jamaica Yaws Commission recommend in their 1932 report that the treatment consist of neoarsphenamine alone or alternating with bismuth in a total approximating six doses (1).

TABLE IV.—*Wassermann and Kahn test readings in 9 cases of untreated syphilis*

Case no.	W	K	Time elapsed since infection	
			Years	
218	++++	+++	24	
46	++++	++++	22	Father of boy who has congenital syphilis.
191	++++	+++	19	
1	−	+++	19	Tabes dorsalis, Charcot knee.
173	+++	++++	16	
350	++++	+++	14	Boy 14 years old. Hutchinson's teeth.
47	+++	++	10	Boy 10 years old. Hutchinson's teeth.
299	−	+++	3	
36	++++	+++	1	

TABLE V.—*Wassermann and Kahn test readings in 11 cases of treated syphilis*

Case no.	W	K	Time elapsed since infection	Treatment
			Years	
39	−	−	20	4 neosalvarsans.
44	−	−	18	6–8 neosalvarsans.
165	−	++	14	2 neosalvarsans.
310	−	−	12	3 neosalvarsans.
335	−	−	6	8 neosalvarsans.
283	+++	++	6 6	2 neosalvarsans.
293	++++	+++	5	3 neosalvarsans with 12 bismuth or mercury.
38	−	±	5	12 neosalvarsans.
169	++++	++	4	2 neosalvarsans.
28	++++	+++	3	3 neosalvarsans with 1 bismuth or mercury.
345	+	+++	2	4 neosalvarsans with (?) amount carbarsone.

Among the 9 untreated cases of syphilis shown in table IV there are found 2 cases of congenital syphilis and 1 case of tabes with Charcot knee. The 11 treated cases of table V are interesting in that they showed no positive evidence of late pathology, and this in spite of the fact of such inadequate treatment.

TABLE VI.—*Wassermann and Kahn test readings in 20 cases with negative history and positive serology*

Case no.	Sex	Age	W	K	Case no.	Sex	Age	W	K
6	M	15	−	+++	18	F	24	++++	+++
8	M	29	−	+++	68	F	36	++++	++++
109	M	41	++++	++++	96	F	17	++++	++++
148	M	21	++++	+++	101	F	46	+	+++
170	M	18	++++	+++	104	F	21	++++	+++
175	M	20	−	+++	129	F	47	++++	+++
236	M	44	++++	++	139 [1]	F	66	+++	++++
343	M	21	+	++	168	F	26	−	+++
225	M	31	+++	+	246	F	23	++++	++
213	M	21	++++	+++	306	F	17	++++	++++

[1] Aortitis.

Of those enumerated in table VI it is quite probable that most of the female cases are of syphilitic origin—history of primary lesion being usually unobtainable from women.

One of these women, case no. 139, revealed a definite aortitis with blowing diastolic murmur, increased area of supracardiac dullness (9.3 cm by X-ray), and symptoms of cardiac decompensation during the last 3 years. She states that 28 years ago she had "rheumatism" for several months. During the rheumatic attack both knees and both ankles were swollen, she was able to do most of her work during the entire period, was never confined to bed on account of her "rheumatism" and does not recall that she had any fever during the attack. Two or three years later she had what is called by the natives of the country districts "Calor de higado" or "liver heat" of the sole of the right foot and the palms of both hands which lasted for more than a year. This "Calor de higado" is a psoriasis-

like dermatitis of the palms and soles and is a frequent late finding in yaws. ("Clavo" or "Clavos" meaning corn or callous, is also used for the same condition.) It is also found in syphilis. She has 12 children and had one abortion after the youngest child was born. She was born and raised in San Juan de Pequeni where yaws was prevalent, but she states that she does not remember ever having had yaws. History of syphilis is also negative. Her rheumatism could be of either yaws or syphilis etiology. On account of the present aorititis many pathologists would definitely place this woman in the syphilis group. The writer feels that there is insufficient evidence to place her definitely in either group.

TABLE VII.—*Wassermann and Kahn test readings in 21 cases with negative history and equivocal serology*

Case no.	Sex	Age	W	K	Case no.	Sex	Age	W	K
7	F	35	−	+	264	F	20	−	+
9	F	14	−	+	282	F	12	−	+
17	F	30	−	++	305	F	27	−	+
79	F	53	−	++	314	F	13	+++	−
92	F	64	−	++	314			+	−
93	M	46	−	++	314			−	−
91	F	7	−	+	357	M	61	−	++
103	F	29	−	+	357			−	−
135	F	42	−	++	42	M	21	+	+
137	F	29	−	++	42			−	+
162	M	21	−	++	308	F	47	+++	−
178	F	59	−	+++	308			+	−
233	F	51	−	++	308			?	−
244	F	25	−	+					

SUMMARY OF WASSERMANN AND KAHN TEST READINGS IN 121 CASES

	Cases
Negative Wassermann and Kahn (yaws and syphilis groups only)	26
Strongly positive Wassermann and Kahn (3+ or 4+)	32
Weakly positive Wassermann and Kahn (1+ or 2+)	4
Strongly positive Wassermann and weakly positive Kahn	12
Weakly positive Wassermann and strongly positive Kahn	4
Negative Wassermann and positive Kahn	10
Negative Wassermann and weakly positive Kahn	31
Strongly positive Wassermann and negative Kahn	0
Weakly positive Wassermann and negative Kahn	2
	121

Table VII will not be discussed in detail. Just what proportion of these have a background of yaws or syphilis is impossible to estimate. It is quite likely that with repeated checks of both Kahn and Wassermann tests, a fair number in this group would react somewhat as the last four cases listed. In case no. 314 the Wassermann was three-plus, a week later two-plus, and finally negative after the second week, with the Kahn constantly negative. In case no. 42 a Wassermann one-plus changed to negative. In case no. 308 there is a constant Kahn negative with Wassermann three-plus,

later two-plus, and finally anticomplementary. The summary of the Wassermann and Kahn test readings needs no explanation, and it is not the desire to enter into any discussion concerning the relative merits of the two tests. But it would appear that the two tests taken together would give more accurate information than either one alone.

TABLE VIII.—*Bilateral epitrochlear adenopathy*

Age group	Yaws			Probably syphilis			No history—positive serology		
	Number of cases	Bilateral adenopathy	Percent	Number of cases	Bilateral adenopathy	Percent	Number of cases	Bilateral adenopathy	Percent
5–10 years	0			0			0		
10–15 years	7	3	42.9	2	2	100	0		
15–20 years	9	5	55.5	0			5	1	20.0
20 years and over	45	12	26.3	18	10	55.5	15	6	40.0
Total	61	20	32.7	20	12	60.0	20	7	35.0

Age group	No history—equivocal serology			No history—negative serology			Total examined
	Number of cases	Bilateral adenopathy	Percent	Number of cases	Bilateral adenopathy	Percent	
5–10 years	1	0	0	32	11	34.3	33
10–15 years	3	0	0	52	16	30.3	64
15–20 years	1	0	0	44	11	25.0	59
20 years and over	16	3	18.7	121	18	14.8	215
Total	21	3	14.3	249	56	22.1	371

In table VIII is a tabulation of the incidence of bilateral epitrochlear adenopathy, further subdivided to show also the incidence for the different age groups. It is considered that the number examined is too small, especially in the syphilis group, to give even an approximate estimate of the actual incidence, but it is believed that the number is sufficient to show the trend. In those cases listed under "No history—Negative serology" the diminishing incidence with advancing age is clearly demonstrated. In considering the 20 cases of "probable syphilis" the higher incidence (60 percent) in this group as compared with the others is shown, but to put it in another way, nearly half of the entire group did not show it. In the 9 untreated cases of syphilis 5 cases did not show epitrochlear adenopathy.

In addition to the tables here shown there are some other findings which are worthy of mention. Juxta-articular nodes were found in six cases, or 10 percent of the yaws cases in the group under consideration. In Darien these nodes were found in 4.4 percent of 424 cases of yaws (3) while in the Haitian group of 1,423 consecutive

cases only 6 cases were found, or 0.42 percent. In view of the very marked difference in the virulence of Haitian yaws as compared with that found in Panama thus far, and reported in an earlier paper (3), may it not be true that the incidence of juxta-articular nodes is a rough expression of the relative virulence of that particular strain of treponema for the locality concerned, and that the higher the incidence of these nodes the milder the virulence of the treponema causing them? All six of the cases here cited gave strongly positive serology. Two of the cases were children of 12 and 13 years with history of yaws the year before. There were 3 cases in adults whose yaws infections dated 30, 40, and 50 years earlier, and 1 case in a man 64 years old who denied both yaws and syphilis. Usually these tumors are bilateral but this feature is not constant.

They are usually seen only in adults but the writer has now seen three cases in Panaman children. A third case in Darien Province was that of a child 7 years old. Hermans, in his monograph on yaws, published in 1931 (4) points out that "it is remarkable that syphilis too, in a tropical and subtropical climate, seems to cause the same sort of lesion (juxta-articular node)." A few such lesions of syphilitic origin have been also reported from the Temperate Zone. He gives it as his opinion that "the nodosities may develop in the fasciæ at places which are continually subject to the pressure of the underlying tissues during sleep. Such places form a *locus minoris resistentiæ* for the spirochæte." One of the cases seen in Gatuncillo presented juxta-articular nodes only on the left side—on the left elbow, and over the external tuberosities of the left fibula at the knee and ankle. This man states that for as long as he can remember he has always slept reclining on his left side. This case would tend to corroborate the theory advanced by Hermans.

There is one other type of case which merits being reported more in detail. Case no. 300 is that of a man 64 years old who had yaws when he was 10 years old. Between 10 and 20 years ago, as nearly as he can remember, or between the ages of 44 and 54, he had a stroke of facial paralysis which is persistent to this date. He denies venereal disease. The Wassermann reaction was negative on two occasions. The Kahn test was reported one-plus on the first test and two-plus a week later. The age at which this cerebral accident occurred is in the border line period between arteritis and arteriosclerosis; and autopsy is the only means whereby diagnosis may finally be established.

Inquiry was also made of all women over 14 years of age as to history of abortions. Of the 10 women in the "Negative history, with positive serology" group, 3 gave a history of abortion. Of the 95 women in the "Negative history, with negative serology"

group there were 30 who gave a history of abortions. The number of women in both groups is too low to be of real value, but the findings correspond with what has been reported to the writer by several observers of long residence here, namely, that abortions are not appreciably more common among women of the Negro race in this locality with a positive serology than it is among those with a negative serology.

Though not a part of the survey which has been reported in this paper, it is of interest in this connection to report here briefly some findings of the yaws clinic conducted in Darien for 15 months, ending last October. From that clinic blood sera were sent in to the Public Health laboratory for analysis in selected cases for whom it was desired to obtain additional evidence, especially in patients presenting unusual lesions of early or late yaws and in another group who came to the clinic for other conditions and who showed no evidence of yaws pathology but who gave a history of yaws infection more than 10 years earlier. (Only one history of probable primary syphilis was obtained in the Darien clinic, and that patient brought his lesion from Colombia.) The sera of 85 Darien patients were examined, of which 61 gave positive, 8 equivocal, and 20 negative reactions. Or 71 percent were positive.

The Darien clinic only served about one-third of the Province, and in the region served it is estimated there was a total population of about 2,500. A total of 447 cases of yaws were treated, or an estimated incidence of clinical cases of 18 percent. But it must be borne in mind that this incidence figure cannot be compared with the incidence of 16.4 percent obtained for the Chagres River group, for in Darien only those cases were listed which came to the clinic with active yaws pathology and to whom treatment was given. If those apparently well but with positive history could be added it is believed that the incidence figure would be more than doubled.

In conclusion, no further summary is required than that contained in the tables, but this opportunity is taken to discuss briefly certain phases of the yaws-syphilis problem. From casual observation it would seem that locally there has been a tendency on the part of both clinicians and pathologists to classify all positive serological reactions as of syphilitic origin. Such an attitude is probably justified for those cases who have been born and raised in the large centers of population. Certainly it is not justified for any cases who were born and have spent a portion of their childhood in the Chagres River region or Darien Province. It is quite probable that the same will apply for many other rural communities after more complete studies have been made.

It is the usual practice in the Tropics to relegate history-taking to the position of least importance in diagnostic procedure. Time is

saved and often the laboratory diagnosis is all that is indicated for a fair percentage of dispensary and hospital cases. It is believed that in order to arrive at more accurate morbidity statistics for yaws or syphilis history-taking must be given first importance. It has been the universal experience of all workers in the yaws clinic that all patients, or in the case of a child, the parents living in an endemic yaws area, almost invariably diagnose yaws correctly in the early periods, and even for lesions of late pathological manifestations they are usually more accurate than the attending physician unless he should be one who has had wide experience in this field. Usually the positive yaws history can be further substantiated by having the patient point out the scar left by the mother yaw.

In the physical examination of the late yaws cases that have originated in the regions studied in Panama the usual tertiary lesions seen are the atrophic and hypertrophic keratoses of the palms and soles, persistent ulcer over the site of the mother yaw, and juxta-articular nodes. Hermans has also noted ganglia of the tendon sheaths (4). One such case was seen in Nuevo San Juan. None of these findings should be considered pathognomonic and it must not be forgotten that most of the old cases of apparently healed yaws show nothing at all.

The ultimate solution of the yaws-syphilis controversy would seem to rest on whether it can be proved that yaws does or does not occasionally cause "syphilitic" arteritis. It is believed that only by more careful clinical and pathological study of long series of cases in different localities will this question finally be answered.

In this connection it is considered that the finding of arteritis in cases of the first or second decade of life with positive yaws history would be more convincing evidence supporting the identity theory of yaws and syphilis, but it is believed that the most convinced believer in the identity theory usually admits that the two types of treponema concerned are widely separated in virulence. For this reason it is anticipated that even with the yaws infection occuring one or two decades earlier than is usual with syphilis it is expected that any arterial pathology that may be discovered would be found in age groups even older than among the syphilitic group. Of course here the dualist would insist that syphilitic atheromatous changes in such cases would be due to syphilis superimposed on the previous yaws infection. But it must be remembered that evidence is constantly accumulating to the effect that untreated yaws cases do not contract syphilis under natural conditions, except in extremely rare instances. It is the writers opinion that very rarely yaws does attack the arteries, causing aortitis and cerebral thrombosis or cerebral hemorrhage.

I wish to take this opportunity to express my appreciation to Dr. L. B. Bates and the Board of Health Laboratory personnel, Ancon, for doing the serological work on all blood sera.

REFERENCES

(1) Report of the Jamaica Yaws Commission for 1932.
(2) Medical Department Annual Reports, Colony and Protectorate of Kenya.
(3) Wilson, Paul W., Amer. Jour. Trop. Med., Jan., 1934.
(4) Hermans, E. H., "Framboesia Tropica", published by "Society of Tropical Medicine Laiden-Rotterdam.