FILARIASIS IN PORTO RICO

II. NOTES ON FAMILY INCIDENCE AND CLINICAL MANIFESTATIONS

By ALICE M. B. BURKE, M. D.
From the School of Tropical Medicine of the University of Porto Rico under the auspices of Columbia University.

Although the epidemiology of filariasis has been studied more or less thoroughly in several countries where the infection is endemic very little attention seems to have been given to the question of spread in families.

Anderson in a report on "Filariasis in British Guiana", cites the case of a white native who had had filariasis for 45 years while eleven near relatives were negative. The blood of 4,215 persons was examined with 19.8 per cent positive for microfilariae but no further statement is found regarding the distribution in families.

Barr, working in the Fiji Islands, examined 1,320 people with 27.1 per cent harboring microfilariae, but he also does not discuss the question of family incidence. O'Connor in his report on Filariasis in the Ellice, Tokelau and Samoan Islands makes the following significant statement (page 19): "I carefully attended to the question of family incidence, although in small isolated communities, where matrimonial conventions are not particularly strict, family peculiarities are not likely to persist unmingled. As a matter of fact, except among Euronesian families, the signs and symptoms of infection in families domiciled together correspond generally with those of the particular community." In another place in the report (page 30) he says: "The question of family incidence was considered, and in each island statistics of three families were collected and recorded. As would be expected in small, isolated, consanguineous communities of people living on a footing of equality, under the same conditions of existence, in atolls only a few square miles in extent, the phenomena of infection in the family and in the community are identical. In both cases young children usually show no signs of filarial infection; older children more commonly have microfilariae in the blood without symptoms; adolescents and young adults show signs and symptoms of clinical filariasis with or without microfilariae in the blood; and older people may have elephantiasis."

SOURCE OF MATERIAL AND METHOD OF INVESTIGATION

The collection of material for this investigation has been made in conjunction with two other studies, a general survey of filariasis in Porto Rico by Dr. Wm. A. Hoffman, Mr. R. A. Marín and the writer, and a study of elephantiasis and other clinical manifestations by Dr. G. Burke and Dr. F. W. O'Connor. For this reason the choice of the areas investigated as well as the cases examined has been determined in considerable part by circumstances.

Of the 248 cases studied, 84 were residents of Aguadilla, an old historic town at the western end of the island with an estimated population (1928) of 8,799; 115 lived in Puerta de Tierra, a "barrio" of San Juan, containing a large area of very poor houses, many of them temporary buildings. The remaining 49 cases came from various parts of the Island. The cases have been arranged in four groups for the better interpretation of the findings.

Group A includes 52 persons taken as a sample of the general population of Porto Rico. The group includes 11 healthy young adult women who applied for admission to the Nurses' Training School of the Presbyterian Hospital together with 41 men, women, and children taken at random from the wards of this hospital.

Group B includes 102 persons seen at two clinics (Aguadilla and Puerta de Tierra, San Juan) to which cases of elephantiasis were invited to come with their families for examination. This is consequently a selected group with a high incidence of elephantiasis. There are 84 cases from Aguadilla and 18 from Puerta de Tierra.

Group C includes 18 persons comprising 6 families in Puerta de Tierra. In each family there was one member with elephantiasis. This group was studied after it was found that the elephantiasis survey (Group B) did not give the desired data. That is, it was seen that a house-to-house study was necessary since entire families could not be depended on to come to clinics.

Group D includes 76 cases from a selected area in Puerta de Tierra. Earlier in the year the class in medical entomology in the course of field trips for studying mosquito breeding visited this area, which is at the extreme eastern end of Puerta de Tierra between the new and old "carreteras". St. Agustín street forms the center of the area. One section consisting of some 20 houses, all but one of which are mere shacks, is not supplied with water from the city

mains and the people must depend on collected rain water or water brought in containers from a distance. Water barrels were found swarming with mosquito larvae (Aedes and Culex). The other part of the section just west of the first has houses of better construction and are connected with the city water supply. An open sewer nearby contained many Culex larvae but in smaller number than in the rain barrels of the first section. Reports of the prevalence of filariasis in Puerta de Tierra and the abundance of house mosquitoes in this particular section led us to choose it as suitable aera for a house-to-house survey from which facts about family incidence of filariasis might be drawn.

TABLE I

ANALYSIS OF ENTIRE SERIES ACCORDING TO AGE AND SEX

Group	No. of cases	Male	Female	1-20 years	20-39 years	40-59 years	60 years
A.....	52	28	24	25	18	6	3
B.....	102	18	84	31	33	34	4
C.....	18	3	15	7	6	3	2
D.....	76	18	51	30	26	18	2
Total.....	248	74	174	93	83	61	11

Table I gives an idea of the age groups into which the 248 cases fall. Young people are in the majority. Women are greatly in excess of men. This fact is of no significance; it simply means that more women were available for study. It is perhaps of interest that while a majority of the cases of elephantiasis seen were in women, a higher per cent of positive bloods for microfilariae was found in men.

EVIDENCE OF FILARIASIS

Following the opinions of O'Connor and others we have considered a definite elephantiasis, recurrent lymphangitis with fever, lymph varix or hydrocele[1] as presumptive evidence of filariasis. In no group was the percentage of cases showing such evidence of filariasis less than 11 and the average for the 248 cases was 37 per cent. The percentage of the different manifestations or signs of filariasis among the members of the several groups of cases studied is shown in Table II.

[1] The relation of hydrocele to filariasis in Porto Rico may be questioned. The point will be fully discussed in a later communication by O'Connor and G. Burke.

TABLE II

ANALYSIS OF CASES WITH RESPECT TO INCIDENCE OF FILARIASIS

Group	No. in group	Mcf. in blood, no symptoms	Mcf. in blood and symptoms	Elephantiasis and no Mcf in blood	Other evidence of filariasis and no Mcf. in blood	Per cent showing Mcf.	Per cent showing evidence of filariasis
A	52	2	1	1	2	5.7	11.5
B	102	2	1	46	6	2.9	53.8
C	18	0	0	6	4	.0	55.5
D	76	14	0	6	1	18.4	27.6
Total	248	18	2	59	13	8.0	37.1

The technique followed for the blood examination is the same as that described in the first paper of this series by Hoffman, Marín, and Burke (this Review, 1928, IV, 3.)

The blood is taken between 7: 30 and 10: 30 p. m. and either examined fresh immediately or a thick film is made which is stained and examined later. Many of the physical examinations were made in the day time before or after the blood examination.

Since we are dealing here not only with selected cases but selected localities the percentages have scarcely any application to the general population of Porto Rico.

ELEPHANTIASIS

Table III shows the age grouping of the elephantiasis cases and the part affected. The leg is clearly the location of choice. It is noteworthy that in six of the cases the elephantiasis developed before the age of twenty. The two youngest cases in the series were ten and fourteen years old respectively.

TABLE III

ANALYSIS OF ELEPHANTIASIS CASES ACCORDING TO SEX AND PART AFFECTED

Group	No. of cases	Male	Female	Part affected			
				Leg	Scrotum	Arm	Breast
A	1	1			1		
B	46	4	42	46			
C	6		6	6			1
D	6		6	6			
Total	59	5	54	58	1		1

OTHER MANIFESTATIONS OF FILARIASIS

The findings regarding the relation of age to other manifestations of filariasis than elephantiasis are shown in Table IV. One family of 5, including a child, gave a history of filarial lymphangitis in all. Lymphangitis according to our observation is the commonest manifestation of filariasis though it is possible that more thorough histories might have brought out a higher incidence of hydrocele, and might possibly have revealed cases of chyluria. This is, of course only conjecture and an admission that our histories were sketchy.

TABLE IV

ANALYSIS OF SYMPTOMS OF FILARIASIS OTHER THAN ELEPHANTIASIS

Group	No. of cases	Male	Female	Lymphangitis of leg	Lymphangitis of arm	Hydrocele	Lymph Varix
A	5	3	2	2		2	1
B	6		6	6			
C	4	2	2	3	1		
D	1		1		1		
Total	16	5	11	11	2	2	1

MICROFILARIAE IN BLOOD

Although other investigators have found microfilariae in the blood of elephantiasis cases, the 59 cases in this series were all negative. On the other hand, only 2 of the 20 cases with microfilariae in the blood showed any symptoms of filariasis. One has had one attack of lymphangitis, the other was a case of lymph varix.

Table V is an analysis of the cases with microfilariae in the blood.

It is noteworthy that the youngest was a girl of 9, and that 8 of the 20 cases were people under twenty years.

TABLE V

CASES WITH MICROFILARIAE IN THE BLOOD

Sex	Age	Town	Symptoms
Male	12	Aguadilla	None
Male	16	Aguadilla	None
Female	43	Aguadilla	Lymphangitis (one attack)
Female	18	San Sebastián	None
Male	48	San Juan	Lymph varix
Male	11	Santurce	None
Female	35	Puerta de Tierra	None
Female	34	Puerta de Tierra	None
Female	20	Puerta de Tierra	None
Male	37	Puerta de Tierra	None
Female	50	Puerta de Tierra	None
Female	44	Puerta de Tierra	None
Female	38	Puerta de Tierra	None
Male	19	Puerta de Tierra	None
Female	9	Puerta de Tierra	None
Male	29	Puerta de Tierra	None
Female	17	Puerta de Tierra	None
Female	50	Puerta de Tierra	None
Female	36	Puerta de Tierra	None
Female	10	Puerta de Tierra	None

DATA RESPECTING FAMILY INCIDENCE

The study was begun in families of which at least one case of elephantiasis had been discovered. In 33 such families the blood of at least one other person living in the same house was examined. The findings in this group are represented in the following summary:

Condition	No. of families
One parent has elephantiasis without mef. One child has no mef. and no symptoms	12
One parent has elephantiasis without mef. Child has no mef. but shows symptoms	2
One parent has elephantiasis without mef. One child shows mef. but no symptoms. Two other children show no mef. and no symptoms	1
One parent has lymphangitis but no mef. Two children have lymphangitis with no mef.	1
[1] Both parents and one (only) child have elephantiasis without mef.	1
[1] One parent and one child have elephantiasis, other parent and other two children have lymphangitis without mef.	1
[1] One parent has elephantiasis without mef. and four children negative for mef. and symptoms	3
[1] One parent has elephantiasis without mef. other parent and two children show no symptoms and no mef.	1

[1] Entire family living under one roof examined. In all other cases only certain members of the household willing to have blood taken were examined.

One child has elephantiasis without mef. No other member of family has symptoms. Father's blood negative for mef.	1
Wife has elephantiasis without mef. Husband shows no mef. and no symptoms	1
Sister or brother of elephantiasis case, no mef. and no symptoms	2
One unrelated person living in house with elephantiasis case shows no mef. in blood and no symptoms	7
Total	33

It is noteworthy that in one family of five there were three cases of lymphangitis and two of elephantiasis, and that in another family the father, mother and one child all had elephantiasis. In one family one parent and two children had lymphangitis.

Many of the families investigated belonged to the laboring classes in the heavily infected district of Aguadilla where both our studies and those of Dr. O'Connor and Dr. G. Burke, indicate that it is rare to find a family in which no member shows any evidence of filariasis.

In the house to house survey, blood was taken from members of 17 households. These households included 61 of the 76 cases of Group D. The percentage of microfilariae for the whole group was higher than that for the seventeen household groups. Nine of the seventeen families each had one positive in a family. The numbers of other members examined in each of these seven families were two, three, three, four, four, five and six, respectively. In only one family was there more than one person showing microfilariae. This was the Flores family in which seven people were examined and three were positive, a mother, her son and her sister. The sister had come to Puerta de Tierra four years before, which fact made the findings less significant. The complete record for these seventeen households is shown in Table VI.

It is noteworthy that 10 of the 61 individuals showed microfilariae in the blood, a percentage of 16.4. If the 5 cases of elephantiasis are excluded on the ground that such cases very rarely show microfilariae, the percentage is 17.8.

The significant fact in this study is not, in our opinion, that more than one case of filariasis is often found in a family but that under apparently optimum conditions for infection many families are found in which only a single member has microfilariae in the blood.

TABLE VI

RESULTS OF HOUSE TO HOUSE STUDY OF 17 FAMILIES (61 PERSONS) OF A HEAVILY INFECTED DISTRICT (FROM GROUP D)

Name	Relationships	Age	Mcf. in blood
Esquilín	Father	50 years	Negative
	Mother	50 years	Negative
	Daughter	20 years	Positive
	Grand-daughter	10 months	Negative
Ortiz	Father	46 years	Negative
	Mother	44 years	Positive
	Daughter	22 years	Negative
	Grandson	7 years	Negative
	Grandson	5 years	Negative
	Grand-daughter	7 months	Negative
Ríos	2 Brothers	25 years	Negative
Morales	Husband,	24 years	Negative
	Wife	21 years	Negative
Cabrera	Father	39 years	Negative
	Mother (1)	36 years	Negative
	Son	6 years	Negative
	Daughter	10 years	Negative
Flores	Mother	38 years	Positive
	Son	19 years	Positive
	Son	12 years	Negative
	Daughter	16 years	Negative
	Sister (2)	34 years	Positive
	Niece (2)	4 years	Negative
	Niece (2)	1½ years	Negative
Rivera	Husband	55 years	Negative
	Wife	50 years	Negative
Cintrón and Olivera	2 unrelated persons living together for 12 years		Negative Negative
Medina	Mother (1)	44 years	Negative
	Daughter	16 years	Negative
	Son	9 years	Positive
	Grandson	1½ years	Negative
	Boarder (day)	4 years	Negative
Camacho	Husband	53 years	Negative
	Wife	54 years	Negative
García	Mother (1)	32 years	Negative
	Son	5 years	Negative
Montes	Mother (1)	40 years	Negative
	Daughter	19 years	Negative
Lukes	Mother	50 years	Positive
	Daughter	28 years	Negative
	Daughter	16 years	Negative
Coto	Sister	22 years	Negative
	Sister	18 years	Negative
	Sister	17 years	Negative
	Sister	14 years	Negative
	Relative	17 years	Positive
	Relative	29 years	Negative
	Relative	11 years	Negative
Brigones	Mother (1)	50 years	Negative
	Daughter	20 years	Negative
García	Sister	21 years	Negative
	Sister	16 years	Negative
	Sister	12 years	Negative
	Sister	10 years	Positive
Román	Mother	55 years	Negative
	Son	36 years	Positive
	Daughter	24 years	Negative
	Daughter	20 years	Negative
	Daughter	15 years	Negative

(1) Has elephantiasis. (2) In Puerta de Tierra for only five months.

In addition to the data relating to family incidence a number of facts of interest in respect the general problem of filariasis were brought to light in the course of the survey. For example, in Aguadilla, the following significant history was obtained. A policeman said that some 10 years ago the town physician asked him to go to a patient's home at midnight, waken her and bring her to the office. The patient was a case of advanced elephantiasis and the doctor was greatly disappointed not to find microfilariae in the blood. The policeman become interested and although he had no symptoms, he suggested that the doctor examine his blood. The doctor complied and was surprised to find microfilariae. Later the policeman had several attacks of lymphangitis and at our examination ten years after the first examination, no microfilariae could be demonstrated.

Another patient, a young high-school girl, said that three years before she had been refused admission to the Presbyterian Hospital Nurses Training School (San Juan) because of microfilariae in her blood. Since then she has had no treatment and there have been no symptoms suggestive of filarial infection; yet microfilariae were not demonstrated in her blood at our examination.

Two women (mothers) showing a marked elephantiasis each claim to have had an attack of lymphangitis when their last child was born. Neither mother has microfilariae in the blood now. The two children, two years and 10 years old, are also negative, though the older one has had attacks of lymphangitis since he was two years old and now he has marked elephantiasis of the leg.

SUMMARY

A limited survey was made of two filarious districts in Porto Rico with special reference to family relationship of infected persons. Of the 248 persons examined 59 had elephantiasis and 20 showed microfilariae in the blood. Many households were found in which there was only a single person with microfilariae in the blood, in spite of apparently optimum conditions for a spread of the infection. That is, a striking tendency to spread in families was not seen.

On the other hand, among households is which one member had elephantiasis, there were several families in which some evidence of filariasis was noted in every member, and in 18 of 33 families in which one member had elephatiasis a second member showed some other evidence of filariasis.

The youngest elephantiasis case seen was a boy of ten, with a history of lymphangitis beginning at two years. In a majority of

cases the attacks of lymphangitis began between twenty and forty. The youngest case showing microfilariae in the blood was a girl of nine; 8 of the 20 positive cases were under twenty.

None of the 59 cases of elephantiasis showed microfilariae in the blood. Of the 20 which showed microfilariae only 2 had any symptoms.

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