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MALARIA INFECTION OF THE PLACENTA AND ITS INFLUENCE
ON THE INCIDENCE OF PREMATUREITY IN EASTERN NIGERIA

by

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The amount of information on the relationship between malaria infection and prematurity is increasing but still inadequate. Previous work by Bruce-Chwatt (1952), by Archibald (1956) and by Cannon (1958) indicated that the malaria infection of the placenta has an effect on the prematurity of the new-born African baby.

The present investigation adds more information to this important problem. The material for this investigation came from African women who delivered their infants during the period January-November 1958 in one of eight maternity homes (Eteh, Enugu Ezike, Ibagwa, Aku, Nkpologu, Nibo-Ukpabi, Adani and Obollo Afor) in Nsukka Division, Eastern Nigeria. Records are available of 591 confinements, of which 576 were single and 15 twin deliveries. In each case thick blood films were taken immediately after delivery from the maternal side of the placenta and from the heel of the new-born baby. Simultaneously, the weight of the infant was registered. The films were stained with Giemsa stain and examined for the presence of malaria parasites.

In 140 cases (23.7%) the placental smear showed evidence of malaria parasites - mainly Plasmodium falciparum. This percentage was somewhat lower than the parasite rate for adults in Nsukka Division, which during the same period was about 28%. It should be mentioned that many women at one time or another during their pregnancies take some antimalarial drugs. As a matter of fact, in the ante-natal clinics held at the above-mentioned maternity homes pregnant women receive as a routine - as long as stocks are available - prophylactic antimalarial treatment, but many do not attend regularly and some come for delivery without ever having attended the ante-natal clinic.

Of the 576 single deliveries 136 (23.7%) showed a malaria infection of the placenta, while 440 placentae were not infected.

WHO (1950) has defined a premature baby as one which weighs less than 5-1/2 lb. (2500 g) at birth, but for Negro children this standard is not universally accepted. In Nigeria not all such babies are physiologically premature but the term may be considered useful for the purpose of this investigation.

Of the 136 single deliveries from mothers with infected placentae 56 new-born babies (41.2%) weighed 2500 g or less at birth, and were therefore classed as premature. This percentage contrasts with the findings in 440 births from uninfected placentae, since in this latter group only 19 (27.0%) were premature.

No differentiation was made between (apparently) full-term deliveries and others; this would have been difficult on account of the unreliability of the available information.

Table 1 shows the frequency of various birth weights in children born from malarious and non-malarious placentae, examined in the course of this investigation.

TABLE 1. RELATIONSHIP BETWEEN THE MALARIA INFECTION OF THE PLACENTA AND BIRTH WEIGHT IN NSUKKA

	No.	%	Mean birth weight
Infected placentae	136	23.7	6 lb. 4.4 oz. (2 851 g)
Non-infected placentae	440	76.3	6 lb. 7.4 oz. (2 940 g)
Total	576	100	

The difference between the birth weight of babies from infected placentae and those from non-infected placentae was 89 g.

Table 2 shows the frequency distribution of weights of new-born African babies in the two groups.

TABLE 2. BIRTH WEIGHTS IN RELATION TO THE INFECTION OF THE PLACENTA

Weight at birth (pounds and grammes)	Malarious placentae		Non-malarious placentae	
	No.	%	No.	%
3 lb. 1361 g	1	0.7	1	0.2
3-1/2 1588	1	0.7	3	0.7
4 1814	3	2.2	8	1.8
4-1/2 2041	5	3.7	11	2.5
5 2268	19	13.9	44	10.0
5-1/2 2495	27	19.8	52	11.8
6 2722	23	16.9	93	21.1
6-1/2 2948	22	16.2	86	19.5
7 3175	17	12.5	70	15.9
7-1/2 3402	12	8.8	44	10.0
8 3629	5	3.7	21	4.8
8-1/2 3856	0	-	4	0.9
9 4083	1	0.7	2	0.5
9-1/2 4310	0	-	1	0.2
Total	136	99.8	440	99.9

It was pointed out by Archibald (1956) that first pregnancies are more likely to produce babies below 2500 g of birth-weight, regarded as criterion of prematurity. The analysis of our series in both malarious and non-malarious groups of placentae gave the following results (Table 3).

TABLE 3. RELATIONSHIP BETWEEN THE PARITY OF THE MOTHER, FREQUENCY OF PLACENTAL INFECTION AND BIRTH-WEIGHT

Parity	Malarious				Non-malarious				Positive placentae %
	No.	Premature		Mature	No.	Premature		Mature	
		No.	%			No.	No.		
Not known	1	-	-	1	-	-	-	-	-
1	47	10	21.3	37	82	18	22.0	64	34.5
2	30	3	10.0	27	88	18	20.5	70	22.0
3	27	7	25.9	20	78	7	9.0	71	19.8
4	12	2	16.7	10	72	7	9.7	65	8.8
5	7	2	25.7	5	44	2	4.5	42	5.1
6	7	2	25.7	5	29	5	17.2	24	5.1
7 and over	5	2	40.0	3	47	8	17.0	39	3.7
Total	136	28	20.6	108	440	65	14.8	375	23.1

Disregarding first-born babies and those from seventh parity onwards, and considering only those parities where the rate of prematurity is normally at its lowest, viz. 2nd-6th, the low birth-weight is more common in infants from mothers with infected placentae. Of 67 deliveries from mothers of these parities who had infected placentae, 16 (23.9%) were premature, in comparison with 39 (14.3%) of 272 non-infected mothers of the same parities. The difference of 9.6% between the frequency of "prematurity" in these two groups is not significant at the $P=0.05$ level but close enough (critical ratio 1.7) to be suggestive.

During the period of investigation 15 twin deliveries took place of whom 4 had malaria-infected placentae. Although filariasis is very common in Nsukka no microfilariae were seen in any of the smears, save in one single case of early abortion where Acanthocheilonema perstans were found in the placental smear accompanied by a high eosinophilia. (This case is not included in the 591 pregnancies analysed above.)

We have also investigated the evidence for "congenital malaria", when malaria parasites are present in the blood of a new-born child.

It is noteworthy that not a single thick film taken from the 576 new-born showed any presence of malaria parasites. (Even in the nine cases where the placenta was packed with malarial parasites none could be found in the infant's blood.) This is in conformity with the observations of previous workers in West Africa who agree that congenital malaria is a rare event and may only be due to some serious breakdown in the protective barrier of the placenta.

Discussion

The present series adds corroborating evidence to the observations made in Lagos by Bruce-Chwatt (1952), in Ilaro in Abeokuta Province, Western Nigeria and in Northern Nigeria by Archibald (1956, 1958) and in Ilesha, Western Nigeria by Cannon (1958). This is shown in Table 4.

TABLE 4. INFLUENCE OF MALARIAL INFECTION OF PLACENTAE ON BIRTH-WEIGHT OF NIGERIAN INFANTS

Series	No. in series	No. with infected placenta	%	Birth-weight below 2500 g		Difference in mean birth-weight between babies born from infected and non-infected placentae
				Infected placenta	Non-infected placenta	
Bruce-Chwatt Lagos	310	73	23.6	20.3	11.0	113 g
Archibald Ilaro, S.W. Nigeria	463	77	15.0	29.4	16.5	170 g
Cannon Ilesha, W. Nigeria	392	130	33.0	37.0	12.0	311 g
Archibald N. Nigeria	440	62	14.1	20.6	8.2	298 g
Present series Nsukka, E. Nigeria	576	136	23.7	41.2	27.0	89 g

Prematurity is certainly the commonest cause of neonatal death. An attempt was therefore made to record all deaths of single born infants contained in the present series occurring within the first, second and third months of life. Table 5 illustrates the distribution of these deaths.

TABLE 5. DEATHS IN INFANTS WITHIN FIRST THREE MONTHS OF LIFE IN RELATIONSHIP TO PLACENTAL MALARIAL INFECTION

	1st month	2nd month	3rd month	Average birth-weight	Number of deaths in group
Malarious placenta (136)	5	3	0	5 lb.11 oz. (2 580 g)	8 (5.9%)
Non-malarious placenta (440)	7	4	4	5 lb.13 oz. (2 637 g)	15 (3.4%)

Of the 15 single babies that died in the group delivered from non-malarious placentae only 4 had been born prematurely; of the 8 in the malarious group only 1 had a birth-weight of less than 5-1/2 lb.

These findings seem to indicate that the correlation between the neonatal mortality and malaria infection of the placenta is not as obvious as might be expected, but the numbers in the sample are small and interpretation of the findings must be cautious. Moreover, there is some evidence that the recorded deaths of infants were below the neonatal mortality rate previously reported in this area of Eastern Nigeria.

The evidence presented in this paper supports the findings of previous workers that malaria infection of the placenta is a cause of low birth-weight in Africans in Nigeria. In Nsukka malaria may account for the premature birth of about 9% of all infants.

Summary

An investigation of 591 deliveries in African women attending the maternity clinics in Nsukka Division, Eastern Nigeria, showed that 23.7% of placentae were infected with malaria parasites (P. falciparum).

Of the 576 single deliveries 136 (23.7%) of new-born babies were from infected placentae and 440 (76.3%) from non-infected placentae. The mean birth-weight of the former group was lower by 89 g in comparison with the latter group.

It appears that the proportion of babies with a birth-weight below 2500 g was 41.2% in the total group of 136 from the infected placentae and 27.0% in the total group of 440 from non-infected placentae. In a selected group of 339 African women between the second and sixth parity there were 23.9% of "premature" babies from 67 infected placentae and 14.3% of "premature" babies from 272 non-infected placentae.

There was no evidence of "congenital malaria", meaning by this the presence of the malaria parasites in the peripheral blood of babies within 24 hours after birth.

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