EFFECT OF SUBCLINICAL MALARIA ON FETAL DEVELOPMENT

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SUMMARY

Sixty one mothers and their neonates were studied for malarial antibody titres in mother and its effect on the newborn. Estimation of antimalarial antibodies was done by ELISA in the maternal and cord blood.

Though forty four mothers were positive for malarial antibody, only one cord blood showed positivity and there was no correlation between antibody titres of maternal and cord blood. However, there was a significant inverse relationship between maternal antibody titres against malaria and various anthropometric measurement of the newborn. Fetal weight, fetal height, head circumference, chest circumference and midarm circumference of the neonate were found to be significantly lower in foetuses born to the mothers having high malarial antibody titres, Thus, subclinical malaria in mothers can lead to intra uterine growth retardation.

INTRODUCTION

The resurgence of malaria in last two decades has been associated with greater incidence of complications. Pregnant women are more prone to have malaria because of the suppressed immunity during pregnancy (Manson-Bahr and Bell, 1987). It was known even at the beginning of the century that malaria during pregnancy adversely affected the foetus. This study was undertaken to know the incidence of subclinical malaria infection and its effect on the fetal growth.

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MATERIALS AND METHODS

Sixty one mothers and their new-

borns were included in this study to estimate malarial antibodies in the maternal blood and in the cord blood of the neonate. Pregnant women who delivered vaginally without medical and obstetrical complications and without clinical malaria were included. Women with multiple pregnancy, urinary tract infections, tuberculosis, diabetes mellitus, heart disease, pregnancy induced hypertension, renal and metabolic disorders etc. were excluded from the study. Newborns with birth anoxia, congenital malformations, ABO or Rh-incompatibilities, neonatal septicaemia and intrauterine infections were also excluded from the study population along with their mothers.

An anthropometric examination of the newborn included measurement of length, weight, head circumference, chest and midarm circumference. They were also subjected to detailed clinical examination including assessment of gestational age (Usher et al 1966). They were followed up for the first month of life to record any obvious feature suggestive of neonatal septicaemia, intra-uterine infection, congenital malformations not obvious at the time of first examination or presence of significant hyperbilirubinemia .and blood group incompatibility as all these formed the basis of exclusion of case from the study. In addition to routine investigations, thick and thin peripheral smears were examined in all cases for the identification of malarial parasites.

Enzyme linked immunosorbant assay (Micro ELISA) was carried out employing the method of Voller et al (1976) modified by Mohapatra et al (1980) for measurement of antimalarial antibodies.

Statistical analysis was done by using student 't' test.

OBSERVATIONS

The anthropometric measurement of newborns in relation to gestational age are depicted in Table I. Seventy one per cent of the newborns were appropriate for gestational age (AGA).

Forty four mothers (72 per cent) showed positive serology. None of the mothers had symptomatology or signs suggestive of malaria, and parasiteaemia was absent. No correlation was observed between maternal antibody titres and cord blood titres and only one cord blood sample was positive for antimalarial antibody.

A significant inverse relationship was seen between malarial antibody titres and neonatal anthropometric measurement (Table II).

DISCUSSION

Nearly 365 million people i.e. 1/10th of the world's population live in highly endemic areas for malaria without specific antimalarial measures being carried out and 46 per cent of world's population reside in comparatively less endemic zone making it a very important problem. In recent years in South East Asia, significant increase of malaria of particularly serious nature has been observed (Sharma and Mehrotra, 1982).

The present study was carried out an sixty mothers and their newborns to assess the malarial antibodies by ELISA. Seventy two per cent mothers demonstrated positive serology indicating sufficient exposure to malaria. This alarming

Table I

Anthropometric profile of newborn in relation to gestation (weeks) (Mean ± SD)

	Gestation (weeks)							
	< 36		36 - 37		37 - 40		> 40	
	Male	Female (5)	Male (4)	Female (1)	Male (23)	Female (21)	Male (5)	Female (2)
Wt. (g)	—	1770 ± 275.22	2000 ± 356.90	2250	2791.3 ± 501.18	2654.76 ± 396.20	2945 ± 517.68	3200 ± 70.0
L (cm)	—	42.9 ± 1.74	45.12 ± 1.93	45	48.13 ± 2.24	48.33 ± 1.63	49 ± 2.53	50.75 ± 1.06
Cir. Head (cm)	—	33.1 ± 1.81	31.25 ± 1.84	33	33.5 ± 1.42	33.42 ± 0.95	33.4 ± 1.14	33.5 ± 0.70
Cir. Chest (cm)	—	28.28 ± 1.21	28.85 ± 1.35	30.4	31.42 ± 0.96	31.30 ± 0.91	31.06 ± 0.98	32.1 ± 0.14
Cir. Mid arm (cm)	—	7.44 ± 0.32	7.52 ± 0.44	8.0	9.58 ± 1.05	9.16 ± 0.90	9.8 ± 1.03	10.75 ± 0.35

Figures in parentheses denote number of cases

Table II

Anthropometric characteristics of newborn in relation to maternal malarial antibody

ELISA* Values (absorbance)	Weight (g)		Length (cm)		Circumferences (cm) Head		Chest		Mid arm	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
< 1.20 (n = 11)	31.64 ± 521.78	2612 ± 356.77	49.43 ± 1.23	48.62 ± 0.94	34.14 ± 1.21	33.5 ± 0.57	31.72 ± 1.00	31.15 ± 0.75	10.35 ± 0.74	9.16 ± 0.77
1.20 - 1.39 (n = 25)	2700 ± 415.83	2663 ± 668.24	48.07 ± 2.47	47.57 ± 2.97	33.55 ± 1.38	32.77 ± 2.03	31.10 ± 1.44	30.58 ± 2.33	00.64 ± 1.00	9.27 ± 1.29
1.40 - 1.59 (n = 10)	2670 ± 491.93	2230 ± 450.83	47.7 ± 2.48	46.7 ± 2.96	32.84 ± 0.79	32.5 ± 1.32	30.96 ± 0.68	30.28 ± 0.60	8.92 ± 1.18	8.20 ± 0.47
1.60 - 1.79 (n = 6)	2350 ± 141.42	2737 ± 429.45	44.5 ± 0.70	47.87 ± 2.17	32.6 ± 0.70	33.6 ± 0.94	31.2 ± 0.28	31.7 ± 0.62	8.9 ± 0.70	9.5 ± 1.23
1.80 - 1.99 (n = 4)	1950	2283 ± 292.97	47.0	47.0 ± 3.60	32.0	32.5 ± 3.12	30.00	30.16 ± 1.89	8.0	7.97 ± 0.32
2.00 - 2.19 (n = 4)	2025 ± 266.14		46.0 ± 2.73		31.45 ± 2.06		29.9 ± 1.74		7.6 ± 0.38	
> 2.20 (n = 1)		2500		46.5		32.0		32.0		9.5
n = 61	2632.7 ± 544.35		47.6 ± 2.63		33.06 ± 1.579		30.947 ± 1.48		9.146 ± 1.44	

* Absorbance of > 1.2 was considered as positive for malarial antibodies.

percentage of positive malarial antibodies in pregnant population is mentioned in literature sporadically (Jelliffe, 1966).

The concern about malaria in pregnancy is mainly because of its deleterious effects on the fetal growth and pregnancy outcome. In the present series maternal malaria infection had a significant inverse correlation with birth weight, length and head, chest and mid arm circumference of the newborn.

This means that malarial infection during pregnancy probably due to infection of placenta with parasite, leads to intrauterine growth retardation. Some workers (Jelliffe 1966, Mcgregor and Avery 1974, Reinhardt 1980) also reported increased incidence of abortions, stillbirths and prematurity in association with maternal malaria. McGergor (1974) reported reduction in the mean weight of neo-nates by 55-310 gms with parasitised placentae.

Thus, even in the absence of clinical malaria, subclinical infections result in intrauterine growth retardation. Whether treatment of these pregnant mothers with high malaria antibody titres could benefit the fetal outcome needs further studies.

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