SHORT COMMUNICATION

Nutritional Assessment of Newborns of HIV Infected Mothers

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Nutritional status of 50 newborns born to HIV infected mothers in a tertiary care hospital was compared with that of babies born to HIV seronegative mothers, as assessed by birthweight, mid arm circumference to head circumference ratio (MAC/HC), ponderal index (PI), and clinical assessment of nutritional status (CAN) score. The incidence of malnutrition in babies born to HIV infected mothers was 36%, 82%, 20%, and 44% using birth weight, MAC/HC, PI, and CAN scores, respectively, compared to 10%, 56%, 8%, and 22% incidence in babies born to HIV seronegative mothers, respectively. Rate of fetal malnutrition was significantly more in babies born to HIV infected mothers.

Keywords: *Fetal malnutrition, HIV infected mother.*

Pediatric AIDS is poised to become a major public health problem in India(1). Nutritional status of the newborn is an important indicator which determines the fetal malnutrition and also neonatal morbidity and mortality in HIV infection(2). Although some data exist about the deleterious effect of HIV infection on the growth of infected children, no data exists about the role of nutritional assessment of newborn of HIV infected mother, subsequent sequelae of the disease or response to treatment in infants or children. This study is directed towards nutritional assessment of newborns of HIV positive mother using anthropometry, Ponderal Index (PI) and Clinical assessment of Nutritional status (CAN) score.

METHODS

The study was carried out on 100 neonates delivered at Dr VM Medical College and Government Hospital, Solapur, Maharashtra, India, between January 2006 to December 2006. Fifty liveborn, full term neonates of HIV infected mothers [confirmed using 3 ELISA tests (COMB AIDS Kit)] and 50 liveborn, full term, neonates of HIV seronegative mother were enroled. Only neonates whose hospital stay exceeded 24 hours of age and with a known gestational age (last menstrual period or earliest obstetrical ultrasound) were included. None of the mothers had received antepartum anti retroviral therapy (ART). Mothers with other obstetric and medical diseases affecting fetal outcome were excluded from the study.

All neonates were weighed nude on an electronic weighing scale at birth. Length was measured by infantometer. Head circumference and mid-arm circumference were recorded between 24 hours of birth using a standard non stretchable tape. Ponderal index [PI=Weight in grams×100/length^3 (cm)] and MAC/HC ratios(3-5) were calculated from these measurements. A PI of <2.2 and MAC/HC ratio <0.27 were considered as malnutrition. CAN score of <25 was considered malnutrition(6).

RESULTS

In this study 74 neonates born to HIV seropositive mothers were studied. Out of these 24 stillbirths, preterm and babies born to mothers with other obstetric or medical diseases were excluded. The mean birthweight, length, mid-arm circumference and head circumference of the remaining 50

newborns born to HIV seropositive mothers was 2.6±0.4 kg, 46.5±1.7cm, 7.5±1.7 cm, and 32±2.1 cm, respectively, against 2.8±0.4 kg, 48.2±1.3cm, 9.9 ±2.1 cm and 33.7±1.3 cm, respectively in the 50 babies born to HIV seronegative mothers. Thirty-two babies born to HIV seropositive mothers were appropriate for gestational age while 18 were small for gestational age (less than 10th percentile). ***Table* I** depicts the relative distribution of nutritional status in neonates in the two groups as assessed by birthweight, MAC/HC ratio, PI and CAN score respectively. The risk of malnutrition (OR) in babies born to HIV seropositive mothers was 5,4,3, and 10 times compared to babies of HIV seronegative mothers using birthweight, MAC/HC ratio, Ponderal index and CAN score as criteria, respectively. The mean weight gain during pregnancy in mothers was 6.5±1.0 kg in HIV seropositive mothers against 7.2±0.8 kg in HIV seronegative mothers. The coefficient of correlation for weight gain of mothers during pregnancy and birthweight of newborn is high (r=0.91) as compared to other anthropometrical measurements (r=0.61).

DISCUSSION

The mean birthweight of neonates of HIV infected mothers is lower than that of standard Indian neonatal value of 2.8kg. Incidence of low birth weight (<2.5kg) in this study is 36% as against standard 30% incidence of LBW in India(7). A Study by Miller and Hassanein(3) proposed that a full term infant is growth retarded if his PI is <2.2. PI relies on the principle that length is spared at the expense of weight during period of acute malnutrition; weight and length velocities may be proportionately impaired so neonates with chronic insult *in utero* may be misclassified by PI. This attributes the higher values of PI in this study to chronic insult faced by the fetus *in utero*. Meadow and colleagues(8) concluded in their study that the MAC/HC ratio, independent of birth weight, readily discriminated the late gestation growth retarded baby. Their study showed that this ratio can be used as a reliable test to identify neonates whose growth is retarded, even when their weight does not fall below 10th percentile. The statistically significant low values in this study indicate the late gestational insult that neonates of HIV infected mothers face *in utero.* The advantage of CAN score is that it is a simple, clinical index for identifying fetal malnutrition and may have the potential to predict neonatal morbidity associated with it without the aid of any sophisticated equipments. The significant increase in PI of neonate of HIV-infected mother, together with decrease in birth weight, MAC/HC ratio and CAN score suggests that HIV infection exposes the infant to chronic insult *in utero* leading to fetal malnutrition and intrauterine growth retardation.

The main limitation of this study was confounding factors like socioeconomic status, maternal age, parity, nutritional status, micronutrient deficiencies, clinical status, HIV viral load, CD4 count and antiretroviral treatment were not taken into consideration, though all cases were from the same sub-population. Multiple regression analysis study model for each of the potential confounding factors would be essential to attribute the findings of this study to HIV infection. Our results are consistent with several studies in developing countries which have concluded that infants born to HIV infected

TABLE I NUTRITIONAL STATUS OF NEWBORNS AS ASSESSED BY DIFFERENT METHODS

	Birth weight		MAC/HC ratio		Ponderal index		CAN score	
	born to HIV+	born to HIV–	born to HIV+	born to HIV–	born to HIV+	born to HIV–	born to HIV+	born to HIV–
Malnourished	18(36%)	5(10%)	41(82%)	28(56%)	10(20%)	4(8%)	22(44%)	11(22%)
Well nourished	32(64%)	45(90%)	9(18%)	22(44%)	40(80%)	46(92%)	28(56%)	39(78%)
Z value	7.34		6.07		4.98		4.97	
P value	0.0002		<0.01		<0.01		<0.05	

WHAT THIS STUDY ADDS?

- Positive maternal HIV infection status is associated with decreased neonatal birthweight.

mothers tend to have lower birth weights than do infants of seronegative women(9-13).

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