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WEIGHTS OF INFANTS BORN TO HIV INFECTED MOTHERS: A PROSPECTIVE COHORT STUDY IN FEDERAL MEDICAL CENTRE, OWERRI, IMO STATE

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ABSTRACT

The study is a cohort study of Anthropometric Indices of Infants Born to HIV infected mothers at Federal Medical Centre (FMC) Owerri, which aimed at, ascertaining the maternal outcome(s) of HIV infection. The study adopted five research questions and five hypotheses, which revolved around the anthropometric indices of infant. The study's theory was anchored on the Health Belief Model (HBM). The population for the study comprises all the sero-positive and sero-negative mothers who gave consent to the study. The research design is a cohort design with a sample size of 182 infants selected from the two groups of women (positive and negative HIV mothers) using purposive census sampling technique. Anthropometric data collected were presented using frequency and percentages while the hypotheses were tested using t-test at 0.05 level of significance done with the Statistical Package for Social Sciences (SPSS) version 24.0. The findings revealed among others that more infants born of seropositive mothers had lower birth weight, lower weight after 6 weeks.

KEYWORDS: Weights, infants, HIV, mothers.

INTRODUCTION

Acquired Immune Deficiency Syndrome (AIDS) was reported in the United States of America (USA) in 1981 in adults, while in children it was reported in 1982 (Obeagu and Obeagu, 2022; Omo-Emmanuel *et al.*, 2017; Obeagu, 2023). In Nigeria, it was first reported in 1985 in the adult population and 1986 in a 13-year-old child (Abdulsalami and Tekenna, 2006). The causative organism of Human Immunodeficiency Virus (HIV) was identified in 1984. Since then, AIDS and the preceding latent HIV infection, has assumed pandemic proportions in its spread.

In children, less than five years of age HIV/AIDS now accounts for 7.7% of mortality worldwide leading to 19% and 36% rise in infant and under-five mortality respectively. Gains in child survival attributed to implementation of survival strategies have been severely eroded by increasing mortality for pediatric HIV infections (Akintan *et al.*, 2016).

Africa with just over 10% of the world population, accounts for 75%, of total HIV burden. Most of the People living with HIV /AIDS reside in sub-Saharan Africa, which is worst hit by the epidemic with its epi-centre in southern Africa (Obeagu *et al.*, 2022; Viola *et al.*, 2023; Omo-Emmanuel *et al.*, 2017). HIV is transmitted to infants in two major ways, vertically from mother to child transmission (MTCT) and horizontally through unsafe injections, blood transfusions, and sexual contact. However, the primary route of transmission in 90% of cases in the pediatrics' population is through MTCT which covers transmission from an infected pregnant woman to her fetus during pregnancy (in-utero), labour or delivery (intrapartum), and postpartum through breastfeeding (Nielsen and Bryson, 2010).

Furthermore, the study of anthropometric indices and its importance to infants born with HIV cannot be overemphasized. Anthropometric assessment being inexpensive is a practical way to monitor growth and the nutritional status of infants, thereby aiding in the early identification of malnourished infants and the provision of timely interventions(s). By regularly monitoring these indices, it ensures that infants living with HIV receive the appropriate care and support to thrive as the grow and develop. Infants born to HIV-infected women have been reported also to be thinner, with smaller head circumferences than infants of HIV-negative mothers (Ezeaka *et al.* 2009). This poor pregnancy out-comes have been associated with higher risk of vertical trans-mission of HIV, and increased mortality among infected

children (Izuchukwu *et al.,* 2016; Ifeanyi *et al.,* 2015; Obeagu *et al.,* 2016; Obeagu *et al.,* 2016; Ifeanyi *et al.,* 2017)

RESEARCH METHODS

Design of the Study

This is a cohort study carried out at the Federal Medical Center Owerri Imo State (FMCO) during a period of a year and 3 months that is, from January 2020 to March 2021.

Study Area

The study area is Federal Medical Centre (FMC) Owerri, Imo state.

Study Population

The study subjects were pregnant women attending the antenatal clinic at Federal Medical Centre (FMC) Owerri who tested Sero-positive to HIV and sero-negative to HIV after voluntary counseling and confidential testing. One hundred and eighty-two infants from the two groups (sero-positive and sero-negative mothers) were recruited for the study.

The subjects (mothers of the infants) were duly offered pre and post-test counseling and were seen at delivery in the labour ward complex of the hospital.

These infants born to HIV infected mothers (81 in number) and HIV non-infected mothers (101 in number) in Federal Medical Centre Owerri Imo state served as the study's population for the study in other to obtain the anthropometric variables.

Sample Size Determination

Infants born to HIV infected mothers numbered 81 and infants of HIV non-infected mothers numbered 101 in Federal Medical Centre Owerri Imo state. Given that the population for the study was not large, the entire study populations being 182 infants born to seropositive and seronegative mothers were used as the sample size.

Inclusion Criteria

- Fully confirmed HIV positive mothers
- They must have given birth at Federal Medical Centre, Owerri
- They must be on anti-retroviral therapy (ART)
- They must be keeping to antenatal appointment regularly
- They must have given their consent

Sampling Technique

The researcher adopted purposive, census sampling technique for this study. The women who were pregnant and HIV positive and pregnant women who were HIV negative within the time frame of the study were purposively selected for the study. Given that the population for the study was not large, the entire study population being 182 infants born to seropositive and seronegative mothers were used as the sample size (census sampling technique).

Instrument for Data Collection

The subjects were duly offered pre and post-test counseling, and were seen at delivery in the labour ward complex of the hospital. Serological testing for HIV antibodies was done using the commercial enzyme-linked immunosorbent assay. Samples that tested positive were further confirmed by a commercial Western blot technique with the Centre for Disease Control criteria of interpretation. The instruments used in collecting data were weight scale, soft metric tape, calibration weights, stadiometer, non-stretchable tape, infant-meter to measure, and MUAC tapes.

Method of Data Collection

The gestational age at birth was determined from the first day of the mother's last menstrual period, considering when the period had been regular.

Upon delivery, data were obtained from the infants and their mothers', which include; date of birth, sex, birth weight, gestational age, and mode of delivery. After initial data collection had been obtained after delivery, the clinical conditions of the infants were duly monitored and documented until they were discharged with their mother's. Obstetrical ultrasonic measurements during antenatal care were also utilized whenever available.

The appropriateness of the infant's weight for gestational age at birth was determined using the new Ballard's maturity scoring.

The birth weight was taken in a warm room by placing the baby naked on the Waymaster infant spring weighing scales, which were regularly standardized. Readings at this point was read to the nearest 10g. The crown-heel length was determined using a portable infant-meter board. The occipitofrontal circumference (OFC) was measured using a non-stretchable tape. Additionally, all the anthropometric measurements were carried out using standard method.

In addition, all the procedures (anthropometric values) were carefully repeated and documented on all the infants right after six-weeks.

Method of Data Analysis

The research questions were answered using frequency and percentages while student's t-test was used for the comparison of Means i.e testing of the hypotheses and the coefficients were considered to be statistically significant when the P-values are equal to or less than 0.05.

The Statistical Package for Social Sciences (SPSS), Version 24.0 was the statistical software used for data entry, validation, and analysis.

Ethical Clearance

The researcher received approval from the department of Nursing Science, Imo State University (IMSU) Owerri to proceed with the study. An approval to collect the data was obtained from the Head of Department Obstetrics and Gynecology Federal Medical Centre Owerri. The main ethical implications in this research were informed consent, confidentiality, and having no animosity of the participant. The essence of this research was not to infringe on the rights, privilege, and privacy of the respondents; hence their consent was duly sought before data collection. In summary, the following codes of conduct guided this research and its activities:

1. Voluntary participation
2. Freedom from harm
3. Maintenance of confidentiality
4. Respect of human dignity
5. Informed consent by the participants

RESULTS

Table 1: Demographic data of respondents.

Variable	Category	Frequency =182	Percentage (%)
Gender of infants	Male Female	78 104	42.86 57.14
Number of infants	Seropositive mothers Seronegative mothers	81 101	44.51 55.49
Birth weight of infants	Below 2.5kg 2.5-3.5kg 3.1-4kg 4.1kg and above	33 59 71 19	18.13 32.42 39.01 10.44
Weight after 6 weeks	Below 3.5kg 3.6-4.5kg 4.6- 5.5kg 5.6kg and above	20 50 56 56	10.98 27.47 30.76 30.76
Head circumference	26 – 30cm 31- 35 cm 36-40cm 41cm and above	17 4 150 11	9.34 2.19 82.42 6.05
Mid upper arm circumference	Below 10cm 10 – 12 cm 13-15cm Above 15 cm	5 74 95 8	2.74 40.66 52.19 4.41
Length	Below 40cm 41-45cm 46-50cm 51cm and above	2 0 160 20	1.10 0.00 87.92 10.98

Data on table 1 show the demographic characteristics of the respondents. From the 182 infants used for the study, 78 (42.86) are males while 104 (57.14) are females. 81 (44.51%) of the infants were born to HIV seropositive mothers while 101 (55.49%) were born to HIV seronegative mothers. From the 182 infants, 33 (18.13%) of them were born below 2.5kg, 59 (32.42%) weighed 2.5 – 3.5kg at birth, 71 (39.01%) weighed; 3.1 -4kg at birth while 19 (10.44%)) weighed 4.1kg and above.

With regards to infants' weight at 6 weeks, 20 (10.98%) weighed below 3.5kg, 50 (27.47%) weighed between 3.6 -4.5kg, 56 (30.76%) weighed 4.6 -5.5kg while 56 (30.76%) weighed above 5.5kg.

Data on head circumference of the infants show that 17 (9.34%) have their head circumference between 26-30cm, 4 (2.19%) have 31-35cm, 150 (82.42%) have between 36-40 cm while 11 (6.05%) have head circumferences of 41cm and above.

The data further show that only 5 (2.74%) of the infants have mid upper arm circumference below 10cm, 74 (40.66%) have 10- 12cm, 95 (52.19%) have 13-15cm mid upper arm circumference while 8 infants have their mid upper arm circumferences above 15cm.

From the table, only 1 (0.55%) of the infants have heights below 40cm at birth, only 1 (0.55) had height between 41-45cmnone of the infants have heights between 41-45cm, 160 (87.92%) have heights of 46-50cm while 20 (10.98%) have heights of 51cm and above.

Table 2: Birth weight of infants born to seropositive and sero-negative mothers

Variable	Options	Frequency=81	Percentage (%)
Birth weight of Infants of seropositive mothers	Below 2.5kg	27	33.3
	2.6- 4kg	51	63.0
	Above 4kg	3	3.7
Birth weight of Infants of seronegative mothers		**Frequency=101**	
	Below 2.5kg	6	5.9
	2.6- 4kg	79	78.2
	Above 4kg	16	15.8

Data on table 2 show the birth weight of infants of HIV positive and HIV negative mothers at delivery. The trend from the table reveals that 33.3% of the infants born to seropositive mothers were below 2.5kg; 63.0% weighed between 2.6-4kg while 3.7% weighed above 4kg at birth.

Inversely, only 5.9% of the infants born to seronegative mothers weighed below 2.5kg at birth; 78.2% weighed 2.6- 4kg at birth 15.8% weighed above 4kg at birth. This shows that majority of the infants with low birth weight were born to seropositive mothers.

Table 3: Weight of infants born to seropositive and sero-negative mothers after 6 weeks

Variable	Options	Frequency = 81	Percentage (%)
Weight of Infants of seropositive mothers at 6weeks	Below 3.5kg	19	23.5
	3.6- 5.5kg	60	74.1
	Above 5.5kg	2	2.4
Weight of Infants of seronegative mothers at 6weeks		**Frequency=101**	
	Below 3.5kg	1	1.0
	3.6- 5.5kg	46	45.5
	Above 5.5kg	54	53.5

Data on table 3 show the weight of infants of HIV positive and HIV negative mothers at 6 weeks. The trend from the table reveals that 23.5% of the infants born to seropositive mothers were below 3.5kg at 6 weeks; 74.1% weighed between 3.6-5.5kg while 2.4% weighed above 5.5kg at 6 weeks.

Invariably, only 1.0% of the infants born to seronegative mothers weighed below 3.5kg at 6 weeks; 45.5% weighed 3.6- 5.5kg at 6 weeks while 53.5% weighed above 5.5kg at 6 weeks. This shows that majority of the infants who weighed below 3.5kg at 6weeks after birth were born to seropositive mothers.

DISCUSSION

Findings from the study in research question one showed that a larger proportion of infants who weighed below 2.5kg at birth (33.3%) were born to HIV sero-positive mothers. 2.5kg is the standard low birth weight range given by WHO. The corresponding hypothesis revealed a statistically significant difference ($p<0.05$) between the mean birth weight of infants born to seropositive and seronegative mothers. Literally, HIV seropositive mothers had a greater number of low-birth-weight infants compared to their seronegative counterparts. This implies that the birth weight of infants can be strongly predicted by the HIV status of the mother. The reason for this finding could be associated with the fact that HIV is known to cause body mass wasting among infected individuals. Furthermore, the HIV-positive women gain less weight during pregnancy which could be attributed to impaired maternal nutritional status and increased burden of disease given that intestinal mal-absorption, infections, infestations and consequently wasting occurs in HIV-positive women.

This finding is supported by the findings of Stratton *et al*. (2009) who in a cohort study of HIV-positive women in the USA showed a significant association between low CD4% and low birth weight babies.

Also supporting this finding, are the findings of Lowenthal and Phelps (2014) who in a U.S based study, recorded that children born to HIV infected women are at risk of low birth weight as well as prematurity (Lowenthal and Phelps, 2014).

This finding is further buttressed by that of Akintan *et al*. (2015) who in their study on effect of maternal HIV status on infants' birth weight, reported that HIV infected mothers had a higher number of infants who weighed less than 2.5kg as opposed to mothers who were HIV negative. In some of these studies, intravenous drug use during current pregnancy was the factor which best correlated with a reduction in birth weight.

The findings from the study also revealed that the majority of infants who weighed less than 3.5kg at 6 weeks after birth were born to seropositive mothers (23.5%) while only a small percentage of the infants born to seronegative mothers (1.0%) weighed below 3.5kg at 6 weeks. The corresponding hypothesis revealed that there was a significant difference between the weight of infants born to seropositive and seronegative mothers at 6 weeks after birth.

Also supporting this finding are that of Ryder et al (2014), which revealed that the mean weights of infants born to HIV-positive women were about 100– 300g lower than of infants born to HIV-1-seronegative women at 6 weeks.

CONCLUSION

The need to examine the anthropometric indices of every infant cannot be overemphasized. Studying these indices help to shed light on the areas which need immediate concern or adequate attention from birth. HIV status of mothers play a significant role in determining some of the anthropometric outcomes of infants. This is seen in the findings of the study i.e. HIV seropositive mothers had infants with reduced low birth weight and low weight at six weeks.

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