

STUDY OF MID ARM CIRCUMFERENCE (MAC) TO HEAD CIRCUMFERENCE (HC) RATIO AS A CRITERIA FOR IDENTIFICATION OF SMALL FOR GESTATIONAL AGE BABIES

Mani Shankar¹, Sanjeev Kumar¹, Ashok kumar²

¹ - Assistant professor, Department of Pediatrics, Darbhanga Medical College & Hospital Laheriasarai, Bihar

² - Associate professor, Department of Pediatrics, Darbhanga Medical College & Hospital Laheriasarai, Bihar

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Corresponding Author

Dr. Sanjeev Kumar,
Assistant professor, Department
of pediatrics,
Darbhanga medical college &
Hospital Laheriasarai,
Darbhanga, Bihar
E-mail id - kumar99dl@yahoo.
com

Abstract:

Background: The birth weight of the neonate is very important to determine its chances of survival, growth and development. Neonatal mortality is directly related to the birth weight and gestational age.

Objective: To find out a relation between BIRTH WEIGHT & RATIO of Mid arm circumference and Head circumference to identify low birth weight babies in the community.

Materials and Methods: This prospective observational study was conducted in the pediatrics department of a tertiary care hospital. A sample size of 250 new born babies (gestational age 37 completed weeks) delivered between October 2017 to May 2018 were included in this study.

Results: In this study sample most of the newborns lie in the weight group between 2.5 and 3.7 kg., Maximum number of babies had their Head Circumference in the class interval 32.4 to 35.3 cm. 48% of newborns had Mid arm circumference between 9.2 and 10.6 cm. There is an association between birth weight and ratio of Mid arm Circumference (MAC) and Head Circumference (HC)

Conclusion: Birth weight is a very useful indicator of neonatal morbidity and mortality. Weight at birth is also a determining factor of morbidity and mortality in the first year of life and future growth and development.

Key words: Birth weight, Head circumference, Mid arm circumference,

Introduction

Neonates are born in an alien environment to which they have to adapt rapidly and successfully. The birth weight of the neonate is very important to determine its chances of survival, growth and development. Normal birth weight varies between 2500-3999 gms. By international agreement, low birth weight (LBW)¹ has been defined as a birth weight less than

2.5 Kg. (upto and including 2.499 Kg.). Birth weight less than 1.5 Kg. and less than 1 Kg. are termed very low birth weight (VLBW) and extreme low birth weight (ELBW) respectively. Babies are classified depending on (gestational age)² as –

- a) Preterm - Less than 37 completed weeks (< 259 days) of gestation.
- b) Term - 37-41 weeks (259-293 days) of gestation.

- c) Post term - 42 weeks or more (294 days or more).

Birth weight are classified as per maturity and intrauterine growth on standardised grid centile charts.

- a) AGA - Appropriate for gestational age, 10th to 90th centile.
- b) SGA - Small for gestational age, less than 10th centile.
- c) LGA - Large for gestational age, more than 90th centile³.

Neonatal mortality is directly related to the birth weight and gestational age. In India (50 - 60%)⁴ of all infant deaths occur in the first month of life. Of these more than half may die during the first week of birth, the greatest risk being during the first 24-48 hrs. after birth. Over 70% of perinatal deaths⁵ 85% of neonatal deaths and 30% of infant death⁶ occur among LBW babies. Birth weight is an essential criteria for identifying small for gestational age babies. In rural areas, weighing facilities often do not exist. An approximately felt weight by the traditional birth attendant is often recorded as birth weight. Hence an easier and economical method is necessary to diagnose low birth weight which can also be used by paramedical personnel using minimal tools.

Materials And Methods

This prospective observational study was conducted in the department of pediatrics of a tertiary care pediatric hospital Darbhanga Medical College and hospital Bihar from October 2017, to May 2018. Prior approval from the institutional ethics committee was obtained. The sample size was 250 cases. Selection criteria were as follows:

- i) Live born singleton new born of gestational age > 37 weeks.
- ii) All new born whose hospital stay exceeded 24 hours of age.
- iii) Gestational age of each new born was determined by LMP or USG finding and the assessment of gestational age by Ballard score.
- iv) New born with any congenital malformation or sick new born were not included in the study. History and examination of new born in this study was done on a proforma prepared for the study. All neonates were examined between 24-48 hours of birth in a

naked condition. History was reviewed and detailed clinical examination was done. All neonates falling under selection criteria were included in this study. Gestational assessment was done by Ballard's score and was matched with gestational period as calculated from LMP. All measurements were done after taking adequate precautions to prevent hypothermia.

Results

In this study sample most of the newborns lie in the weight group between 2.5 and 3.7 kg.

Maximum number of babies had their Head Circumference in the class interval 32.4 to 35.3 cm. 48% of newborns had Mid arm circumference between 9.2 and 10.6 cm. There is significant difference between the ratio of MAC/ HC among newborns of Small for Gestational Age (SGA i.e. <2.5 kg) & Appropriate for Gestational Age (AGA i.e. ≥2.5 kg) There is an association between birth weight and ratio of Mid arm Circumference (MAC) and Head Circumference (HC).

Distribution of Newborns according to Birth Weight stable -1

Birth Weight (kg)	No.	Percentage
1.2 to < 1.8	21	8.4
1.8 to < 2	15	6
2 to < 2.5	78	31.2
2.5 to 3.73	136	54.4

Table-2 Distribution of Newborns according to measurement of Head Circumferences (HC)

Head Circumference (HC) (cm)	No	Percentage
28.9 to < 30.6	24	9.6
30.6 to < 31.9	49	19.6
31.9 to < 32.9	60	24.0
32.9 to 35.8	117	46.8

Table-3 Distribution of Newborns according to measurement of Mid – Arm Circumference (MAC)

MAC (Cm)	No.	Percentage
6.2 to < 7.8	28	11.2
7.8 to < 8.5	42	16.8
8.5 to < 9.1	50	20.0
9.1 to 10.7	136	54.4

Discussion

Low birth weight is a major public health problem in India in contrast to what is observed in most developed and many developing countries of the world. Measuring birth weight of newborn babies is a very important in the neonatal care services. Birth weight can prognosticate the neonatal and post-neonatal morbidity, mortality, physical and mental developmental during infancy and childhood. Recording of birth weight has become a difficult task in countries like India and other developing countries of the world where most of the deliveries take place in the rural areas where traditional birth attendants, trained dai are main for the intranatal and neonatal care. Therefore for the ease of these rural areas, semiskilled caregivers and rough handling, there have been efforts in various studies like those by Kapoor et al 1996, Bhargava et al 1985, Diamond et al 1991, Hirve et al 1993, Singh et al 1988 and obviously in this present study to find out a simple as well as valid and reliable alternative measure of birth weight. Some of the studies were done at hospital setting and some in the community setting. Study by Bhargava et al 1985⁷ was done in either settings, auxillary nurse midwife taking the measurements in community setting. Dutta Banik 1989⁸, and Hirve et al 1993⁹ also studied on community births where paramedical workers and neonatal care takers including mothers respectively recorded the measurements. But most of the previous studies were done in hospitals (Sharma et al 1986, Vaquera et al 1983, Singh et al 1988, Kulkerni et al 1991). This study was conducted in DMCH Darbhanga, serves as the main referral centre in the north bihar. In this hospital All the live birth delivery babies get the privilege to be examined by the pediatricians after birth. Mothers attending the institution come from mainly middle and low socioeconomic status and from all castes. Thus the study population is the representative neonatal population coming from the urban and rural middle and low socioeconomic families. Selection criteria differs among various studies. In the study of Huque and Hussain 1989¹⁰, only live born, full term babies belonging to healthy mothers of age group 20-35 years were selected. Bhargava et al 1985⁷ selected study population by simple

random sampling. In some study (Neela et al 1991, Raman et al 1992) Singleton term babies without any maternal illness and uneventful pregnancy were selected. Sharma et al, Hirve et al, Dutta Banik, Kulkerni and Rahaman measured all consecutive live births. In this study babies without congenital anomaly or otherwise sick born of healthy mothers by uneventful vaginal delivery constituted the study population.

Conclusion

Birth weight is a very useful indicator of neonatal morbidity and mortality. Weight at birth is also a determining factor of morbidity and mortality in the first year of life and future growth and development. In this study ratio of Mid arm circumference/ Head circumference were studied in relation to birth weight with the index of finding out if it has a good correlation with birth weight and can be used reliably to identify LBW babies.

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