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Research Article

A correlation of trans cerebellar diameter by ultrasonography and gestational age in second and third trimester

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ABSTRACT

Background and Objectives: Increased perinatal mortality incidence has been seen amongst patients whose precise gestational age is unknown. Trans cerebellar diameter is a newer parameter in the estimation of gestational age. Therefore, the present study was conducted with the aim to determine the accuracy of trans cerebellar diameter in predicting gestational age during second and third trimester of pregnancy.

Materials and Methods: The present study was conducted in the Mithila Hospital,Janakpurdham for a period of 1 year. The study included a total of 160 females with singleton pregnancies during their 2nd or 3rd trimester. The characteristic butterfly appearance of the cerebellum hinted the location of posterior fossa. All the data was arranged in a tabulated form and analyzed statistically. Data was expressed in the form of mean with standard deviation. SPSS software16 was used for the analysis of the data.

Results: The present study enrolled 160 subjects, out of which 80 were in their second trimester and 80 were in their third trimester. The mean transcerebellar diameter of subjects in second trimester was 20.22±4.87 and it was 36.01±2.89 amongst subjects in their third trimester. As the gestational age advances, the transcerebellar diameter also increases with it in a linear manner.

Conclusion: Transcerebellar diameter can be used as a reliable parameter to estimate the gestational age and is also not altered in cases of intrautering growth restriction.

Key words: Gestational age, Trans cerebellar diameter, Ultrasonography

INTRODUCTION

Gestational age is a useful tool in obstetrics for managing pregnancy cases and evaluating the development of foetus [1]. Increased perinatal mortality incidence has been witnessed among patients whose precise gestational age is not known. Indeterminate gestational age is related with preterm delivery, low weight infants and increased

post maturity. A well accepted method i.e. Naegele's rule, for estimation of date of delivery, depends solely on the last menstrual period date and it is associated with some issues as some females don't remember their LMP accurately [2]. Estimation of gestational age using sonographic parameters also aid in the management of pregnancy. But they are associated with few limitations like length of femur reduces in cases of achondroplasia, therefore estimation of gestational age becomes difficult [3].

Transcerebellar diameter is a newer parameter in the estimation of gestational age [4,5]. Cerebellum is present in the posterior cranial fossa enclosed within petrous and occipital bones increases its ability to withstand deformity due to extrinsic forces. It is visible by 10-11 weeks through ultrasound. During and after second trimester the growth of cerebellum is linearly with the gestational age. In scenario's of growth restriction, cerebellum is least affected and therefore it is an accurate parameter in estimation of gestational age [6]. Therefore, the present study was conducted with the aim to determine the accuracy of transcerebellar diameter in predicting gestational age during second and third trimester of pregnancy.

MATERIALS AND METHODS

The present study was conducted in Mithila Hospital, Janakpurdham for a period of 1 year (2017 oct-2018 Sept). The study included a total of 160 females with singleton pregnancies during their 2nd or 3rd trimester. Fetuses with congenital malformations, multiple pregnancies were excluded from the study. The hospital board granted permission to conduct the study. A written consent was obtained from all participants in their vernacular language. Gestational age in weeks was correlated with the trans cerebellar diameter in mm using ultrasound (Acuson X300, Siemens). The diameter was measured in the trans cerebellar plane by the placement of electronic calipers at the margins of the cerebellum. The characteristic butterfly appearance of the cerebellum hinted the location of posterior fossa. All the data was arranged in a tabulated form and analyzed in the form of mean with standard deviation. Scatter diagram was used to interprete the relation between gestational age and transcerebellar diameter. SPSS software 16 was used for the analysis of the data.

RESULTS

The present study enrolled 160 subjects, out of which 80 were in their second trimester and 80 were in their third trimester. The mean age of the females was 27.56±3.77 years. The mean trans cerebellar diameter of subjects in second trimester was 20.22±4.87 and it was 36.01±2.89 amongst subjects in their third trimester (Table 1). Figure 1 shows the linear relation of the gestational age with the trans cerebellar diameter. Increase in the trans cerebellar diameter is accompanied by increase in gestational age.

Table 1: Mean values of transcerebellar diameter during second and third trimester

Gestational age	Number of subjects observed	Mean	Standard deviation
Second trimester	80	20.22	4.87
Third trimester	80	36.01	2.89

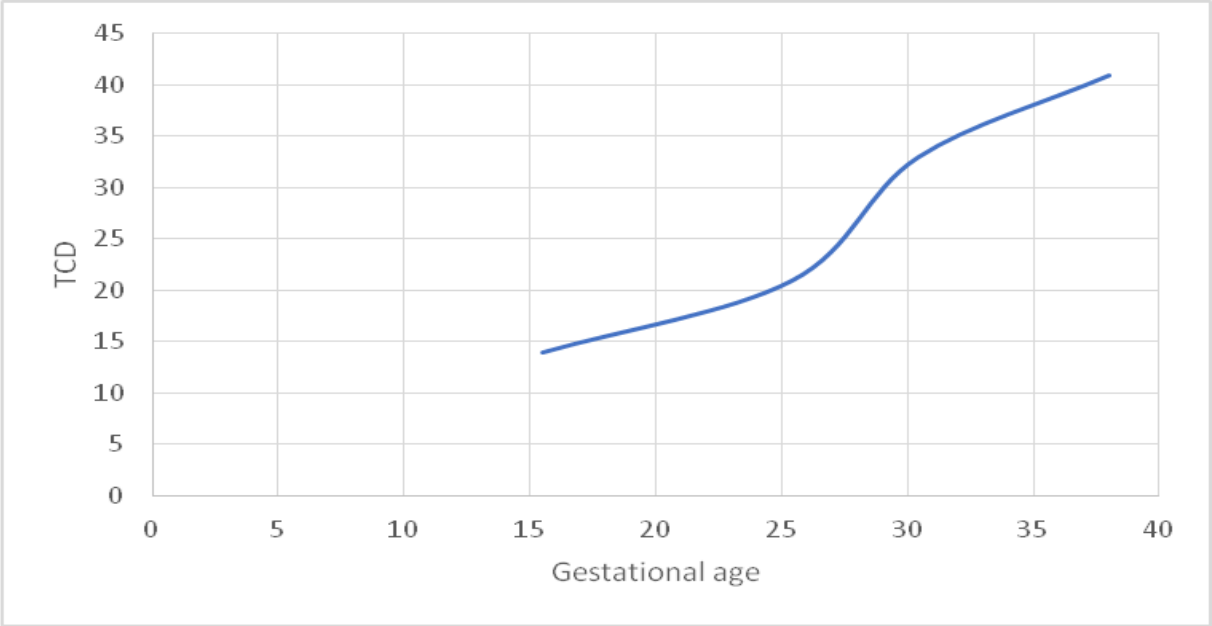

Fig 1: Linear relationship between gestational age and transcerebellar diameter

DISCUSSION

Accurate information about gestational age is needed for appropriate management during the obstetric care [1]. Professor Ian Donald was amongst the first to use diagnostic ultrasonography to examine the pregnant women and is regarded as father of modern ultrasound. Mac Vicar and Brown, they developed the first 2D contact scanner in the year 1958 [7]. In modern era, ultrasonographic examination is used in foetal biometry and last menstrual period time is used in cases where early pregnancy scans are not accessible. Foetal cerebellum becomes sonographically visualized at about 10-11 weeks' gestation. Transcerebellar diameter is minimally affected by factors that alter the foetal growth making it more accurate to estimate gestational age even in third trimester and where there is intrauterine growth restriction [5,6].

As per a study by Chavez MR, the relationship between the actual and predicted gestational age by transcerebellar diameter was significant. This relationship was better during second trimester compared to the third trimester [8]. Chavez et al., also studied transcerebellar diameter in twin pregnancies and came to the conclusion that the association between the actual gestational age and the predicted gestational age by transcerebellar diameter was similar to that of singleton pregnancy [9].

For adequate evaluation of the fetus knowledge of normal embryology and its related ultrasound images, the experience of the operators and the presence of high-resolution equipment is crucial. The present study compared transverse cerebellar diameter and gestation age and found a linear relationship between both. The results of our present study were in accordance with the studies conducted by Meyer et al., [10], Goel et al., [11]. As per the study by Reece et al., [12] they found that transcerebellar diameter (mm) from 15 th to 24 th week of gestation is equivalent to the gestation age (weeks).

Whereas, after 24 weeks then it exceeds gestational age in weeks. Fetal transcerebellar diameter is not dependent on the fetal shape of head and can be measured amongst most fetuses. This is regarded as a reliable predictor of gestational age during the third trimester [11]. Intrauterine growth restriction is suspected when there is discrepancy between uterine size and gestational age. Therefore, the diagnosis should be more precise and objective in order to access the presence of intrauterine growth restriction. Transcerebellar diameter is a better predictor of intrauterine growth restriction.

A study conducted by Cabbad et al., [13] found that transcerebellar diameter was lesser than expected amongst 22 out of 23 asymmetrically growth-impaired fetuses. Therefore, it can be used in the estimation of gestational age amongst fetuses with growth retardation. As per the study by Rotmensch et al., they measured the cerebellar diameter amongst cases of Down syndrome and concluded that cerebellar diameters in Down syndrome fetuses were lower than normal controls at all gestational ages [14].

CONCLUSION

On the basis of observations of the present study, correct estimation of gestational age is important. Using LMP as a gestational age predictor gives us inaccurate results, therefore there is a need to use a parameter that gives stable and fine results. Trans cerebellar diameter in mm corresponds to Gestational age in weeks. Trans cerebellar diameter can be used as a reliable parameter to estimate the gestational age and is also not altered in cases of intrauterine growth restriction.

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AUTHOR'S CONTRIBUTION

AS- study design and manuscript writing, revision, data analysis and final draft scripted; **MKS-** data collection and manuscript writing.

SOURCE OF SUPPORT

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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