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ORIGINAL ARTICLE

Comparison Between Fetal Biometric Measurements (BPD, HC and FL) of Male and Female Fetuses in Population of Pakistan on Antenatal Ultrasound, A Multicentric Study

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ABSTRACT

Objective: The aim of this study was to compare the fetal biometric growth measurements (Head Circumference, Bi-Parietal Diameter, and Femur Length) between male and female fetuses on antenatal ultrasound in our population.

Methodology: This was an observational study carried out in the Department of Radiology CMH Malir, Karachi and Ziauddin hospital, Karachi from July 2016 till July 2018 using non-probability sampling technique. A total of 510 pregnant women with second and third trimester were enrolled for the study. The biometric parameters of fetus i.e., Bi-Parietal Diameter, Head Circumference, and Femur Length were established through two-dimensional ultrasound. Chi-square and t tests were used to analyze differences in biometric parameters in both genders.

Results: The study results showed significant differences in the Bi-Parietal Diameter and Head Circumference between male and female fetuses (p=0.006 and p=0.003, respectively). Mean Bi-Parietal Diameter in males was 71.47±13.70 and in females it was68.30±11.90cm, mean Head Circumference in males was 264.23±47.87and in females it was 252.03±44.91cm. It has also been observed that there was an insignificant difference in the femur length between male and female fetuses (p= 0.605). Mean femur length was 52.74±12.39 in males and 52.19±11.38 in females.

Conclusion: This study concluded that male fetuses have considerably larger bi-parietal diameter and head circumference as compared to female fetuses however, no variation in femur length is observed in both genders.

Keywords: Fetal Gender, Bi-Parietal Diameter, Head Circumference, Femur Length.

INTRODUCTION

The intrauterine growth of fetuses is normally evaluated by gynecologists through ultrasound using different biometric growth parameters, such as Bi Parietal Diameter (BPD), Head Circumference (HC), and Femur Length (FL). One study estimated these parameters during the gestational weeks in pregnancy, and such values are extensively used for monitoring the growth of fetus.[1] The reference values that are related to estimations of fetal biometric parameters for the given pregnancy period are assessed [1],which are applied for monitoring the growth of fetus during pregnancy.

Some researchers have tried to determine correlation between these estimations with demographic and physiological variables, for instance ethnic group, parity, parental height and weight and established modified antenatal growth charts[2].

The differences in the fetal biometric parameters in relation to fetal gender are observed in second and third trimesters, since preliminary examinations in first trimester might not determine these variations [3]. One study reported that Crown-Rump Length (CRL) as well as BPD of male fetuses was bigger than female fetuses, at the initial estimation during 8th to 12th weeks of gestation [4]. However, a current study by Lee et al., reported that insignificant but constant differences related to gender in prenatal BPD and HC were found bigger in male fetuses in 15 weeks of pregnancy [5]. In another study, Moore et at., defined significant differences in the progression of HC in male and female fetuses. Additionally, Moore revealed that the dating of pregnancy period might be imprecise in the second trimester, for the measurements of BPD [6]. Lately, a prospective population based cohort study on 1,782 pregnant women concluded that in the first trimester, the CLR was observed significantly higher in male than female fetuses [7]. This study further revealed that the HC and AC were also found higher in male fetuses at the initial phase of second trimester [7]. Consequently, it can be concluded that the development of male fetuses seems to be higher as compared with the female fetuses during the initial phases of pregnancy as well.

The aim of this study was to compare the fetal biometric measurements of Head Circumference, Bi-Parietal Diameter, and Femur Length between male and female fetuses on antenatal ultrasound in our population.

METHODOLOGY

This study was an observational study carried out in the Department of Radiology CMH Malir, Karachi and Ziauddin hospital, Karachi, from July 2016 till July 2018 by using non-probability sampling technique, after taking ethical

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approval from the Institutional Review Board of the hospital. The duration of the study was two years.

Total of 510 pregnant women in their second and third trimesters were included in the study. Pregnant women in their first trimester and fetuses with anomalies that hinder in taking required biometric parameters were excluded from this study. Ultrasonography was done. All the antenatal scans were performed by radiologists having minimum 3 years of experience. Fetal biometric parameters including BPD, FL and HC along with fetal gender were recorded. They were classified into two groups to assess the gender variations.

SPSS version 22 was used for data analysis. Frequency and percentage was reported for categorical variable such as gender. Mean ± Standard Deviation were presented for numerical variables such as BPD, HC and FL. T-tests were applied to assess the significance. P-values <0.05 were considered as a level of significant.

RESULTS

Among 510 pregnant women, 276(54.1%) fetuses were male and 234(45.9%) were female. Mean BPD, HC and FL of fetuses of both genders is shown in table –I.

Table I: Association between fetal gender and fetal growth parameters.

Variables	Male Mean±SD	Female Mean±SD	p-value
Bi-parietal Diameter (cm)	71.47±13.70	68.30±11.90	0.006
Head Circumference (cm)	264.23±47.87	252.03±44.91	0.003
Femur Length (cm)	52.74±12.39	52.19±11.38	0.605

There was significant statistical differences were observed in the BPD and HC between male and female fetuses (p=0.006 and p=0.003, respectively) which means that male fetuses have larger BPD and HC measurements than female fetuses at a given gestational age. However, FL measurements of the two genders showed no difference at the same gestational age (p= 0.605). Mean femur length was 52.74±12.39 in males and 52.19±11.38 in females.

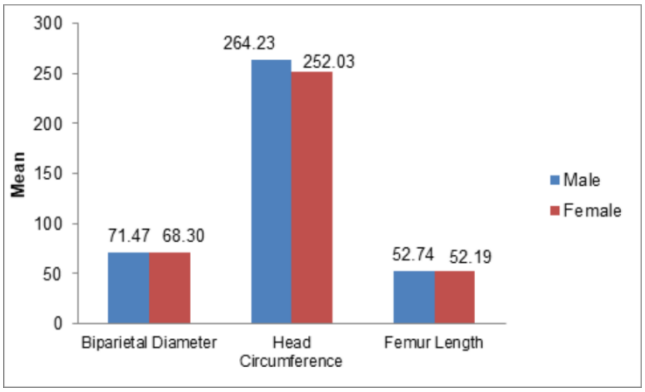

Fig I: Graphical presentation of mean of fetal growth parameters

DISCUSSION

The results of our study demonstrated fetal gender-specific differentiation in the biometric parameters on antenatal scan in pregnancy during second and third trimesters. It has been commonly noticed in our population that the gestational age calculated from the measurements of BPD and HC in male fetuses is one or two weeks ahead than the gestational age calculated from FL in the same fetus, however, in female fetuses the sonographically calculated gestational age is same for all the biometric parameters that are BPD, HC and FL.As this is a commonly noticed variation in male fetuses, this should not be considered as a discrepancy in growth parameters by gynecologists.

Regarding biometrical indices, some research has been carried out in order to focus on fetal gender. This study investigated on gender-specific antenatal development charts [8].These development charts have been focused on the population of 4,234 pregnant women with simply one antenatal dimension. They revealed that the variation between the fetuses of male and female HD along with the proceeding gestational age; however it has no effect on FL in both genders. Likewise, a further study revealed bigger HC and Abdominal Circumference in male fetuses.[7] In another cross sectional study by Busky M et al., fetal gender-specific differentiation was assessed in biometrical indices with a sample size of 427 women .[9]. They also reported a bigger HC of male fetus. Our study is consistent with the above-mentioned studies and showed that measurements of growth parameters such as Bi-parietal diameter and head circumference were found bigger in male fetuses as compared to female fetuses with the significant differences between them (p = 0.006 and p=0.003, respectively).

Another study in Belgium reported that it was imperative in regular obstetrical care; every pregnant woman required a first, second, and third trimester ultrasound scan with fetal growth dimensions. Previous researches illustrated that male fetuses have considerably bigger BPDs as compared to female fetuses during second trimester.[10] These findings were consistent with our studies and proved that male fetuses have considerably larger BPDs as compared to female fetuses. Thus, it has been proved that measurements of growth parameters such as Bi-parietal diameter, head circumference and femur length differ among the gender of fetus.

Limitation of this study is that it might not be immune from selection bias due to the non-probability sampling technique.

CONCLUSION

It has been concluded that in male fetuses, BPD and HC are larger than FL at a given gestational age with the difference of one or two weeks when compared with female fetuses. As this is a commonly noticed variation in male fetuses in our population, this should not be considered as a discrepancy in growth parameters by gynecologists.

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