Orignal Article

Interobserver Agreement of the Sonographic Evaluation for Fetal Biometry among Normal and Obese Mothers

Muhammad Adeel Saleem[1*], Raham Bacha[1], Hamnah Fatima[1], Mahreen Fatima, Muhammad Raheel[2], Zareen Taj[1] and Iqra Manzoor[1]

[1]University Institute of Radiological Sciences & Medical Imaging Technologies (UIRSMIT), The University of Lahore, Lahore, Pakistan
[2]Primary and Secondary Health Punjab, Pakistan

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ABSTRACT

Obesity is a disease and acts to develop myriad of clinical condition. Along with causing other diseases it renders difficulties in some physical and imaging examination of obese patients as a challenge. Therefore, the consistency of results has a great deal of variation for sonographer. **Objective:** Study was aimed to evaluate the interobserver agreement in the fetal biometry among normal and obese mothers. **Methods:** The study includes obese and normal pregnant females with single alive without any anomaly or growth retardation fetus. Low frequency convex array transducer is used. Total 140 Patients were included and categorized according to BMI. Inter item correlation, ICC and CRC were calculated for all variables. Bland-Altman plots were constructed. T-test was applied p-value 0.05 considered significant. **Results:** It was observed that the variation in normal and obese pregnant ladies in third trimester is not significant and a strong agreement between the observers in both normal and obese. **Conclusion:** Obesity causes many problems in sonographic fetal biometry. It was observed that the variation in normal and obese pregnant ladies in third trimester is not significant and a strong agreement between the observers in both normal and obese categories.

INTRODUCTION

Obesity is expanded in all over the world; as stated by the World Health Organization (WHO). The prevalence of obesity is 4 times expanded 4% to 18% all over the world. Anyhow, including increasing of obesity up to a lethal level, Obesity prevalence graph is still increasing. In developing countries like Pakistan, the prevalence of obesity has increased up to dangerous level (27.85%)[1]. WHO defines overweight and obesity as a BMI ranges from 23 to 24.9 and obesity is a BMI elite than or equal to 25 for Asian population and International criteria is separate and that is 25-29.9 for overweight and elite than or equal to 30[2]. Recent studies approximate as many as one in two pregnant ladies have a

BMI ≥ 25[3]. During gestation mean gestational weight gain in Asian population is 8.5kg. In the period of 2016, elite than 1.9 billion adults including age 18 or more were overweight. In these adults more than 600 and 50 million people were obese. So that in these near to 2 billion 39% of total adults including age of 17 or more than that were overweight, and 12% were obese. A great number of people lives where people die including cause of obesity rather than underweight. In obese patients a significant inauspicious event occurs during gestation both perinatal and mothers, as well as increasing the risk of developing BMI [4]. Ultrasonography is technically more difficult for obese

patients than for patients including normal BMI [5]. Few studies have evaluated the ultrasound imaging accuracy of embryonic height estimation in late gestation in obese patients, the results are inconsistent, and the accuracy of ultra-sonographic estimation of embryonic weight is unaffected by mother's BMI [6-8]. Several studies have attempted to answer the question of late gestation accuracy by comparing USG based embryonic weight computations and approximates including those taken at birth [8]. whereas others have concluded that the absolute percentage error for estimates was lower among patients of normal weight and that, consequently, maternal obesity decreased the accuracy of sonographic fetal weight estimation [9,10]. In addition to gestational age estimation, aberrant screening and embryonic biometrics are commonly used to monitor embryonic growth. In obstetrics, it is common for females to perform embryonic biometric scans to find out embryonic health, and in practice, these usually involve a variety of observers. It is important to observe the results of each trimester. This is because each scan needs to be evaluated for embryonic heart rate, its growth, and an assessment of abnormality or growth restriction (FGR) [11]. Therefore, it is surprising that relatively few studies have evaluated the variability of USG computations in embryonic biometrics in relation to mother's BMI from different observers. Some studies work in the third trimester, but most of them do not include the mother's BMI. When during pregnancy ultrasound imaging was first evaluated, the accuracy of embryonic computations was examined in many studies [12,13,14]. However, not all biometric parts have been evaluated in each study. Scans are carry out in relatively small numbers and the ultrasound imaging equipment used is now out of date [14]. Some studies included a limited number of pregnancies because the aim was to assess reproducibility in guessing gestational duration [15,13]. Of course, this is another question. That is, to evaluate the accuracy of the weight estimation equation. The latest study includes only a limited number of fetuses and has not investigated the effects of mother's BMI [16].

METHODS

It was a 9-month cross-sectional analytical study conducted as at University Ultrasound Clinic, Green Town Lahore, from 4 May 2021 to 5 February 2022. A total of 140 pregnant women with a single live fetus were enrolled in the study. The institutional review board (IRB) and the Ethical Committee of the University of Lahore gave their approval. For this study, a Toshiba Xario ultrasound device with a curvilinear transducer frequency of 5-10MHz was used. Patients were informed about the procedure as well as the research's goal, and they signed a written informed permission form. AIUM guidelines for fetal ultrasound

scanning were followed in the study, which is routinely used at University Ultrasound Clinic. During the scanning and publication of the patient, the patient's privacy was prioritized. Two accredited sonographers analyzed the entire fetus using grey scale sonography and then used color Doppler to look for any hemodynamic changes, anomalies, or issues. Each sonographer took two fetal biometry readings of a normal fetus, as well as other factors such as the patient's age, weight, and previous scan history. For data analysis, the Statistical Package for the Social Sciences (SPSS) version 25.0 software was used [17]. Plots and tables were used to summarized the findings. With the classifications of obese and normal, the Interclass Correlation Coefficient and Inter item correlation of all variables were computed. Cronbach Alpha was computed and a Balm Altman plot was created.

RESULTS

Total 140 pregnant ladies with single alive fetuses the fetal biometric findings of all fetuses were recorded. The mean age of the pregnant ladies was 28.5(18-39) years. Among them, 70 (50%) were normal weight pregnant females and 70 were obese pregnant females (50%). Body habitus was categorized on BMI bases. Cron Bach's alpha, Inter-Item. Correlation The p-value for the inter-class correlation was determined. As shown in table 1, Bland Altman's plots for biparietal diameter (BPD), head circumference (HC), abdomen circumference (HC), and femur length FL of 70 normal weight female fetuses were made by both observers. When it comes to regular Cron Bach's alpha, Inter-Item Correlation is the way to go.

Variables	Cron Bach's Alpha	Inter Item Correlation	Inter Class Correlation Coefficient	P-value	T-sig.
BPD1-BPD2	0.995	0.991	0.995	0.000	0.203
HC1-HC2	0.799	0.736	0.800	0.000	0.457
AC1-AC2	0.846	0.733	0.847	0.000	0.941
FL1-FL2	0.986	0.973	0.985	0.000	0.069

Table 1: CronBach's Alpha Inter Item Correlation Inter Class Correlation Coefficient Its P-Value and T-test Significance for 70 normal weights female's fetuses measured by both observers

Table 2 shows the inter class correlation, p-value, and Bland Altman's plots for biparietal diameter (BPD), head circumference (HC), abdomen circumference (HC), and femur length FL of 70 obese female fetuses assessed by both observers.
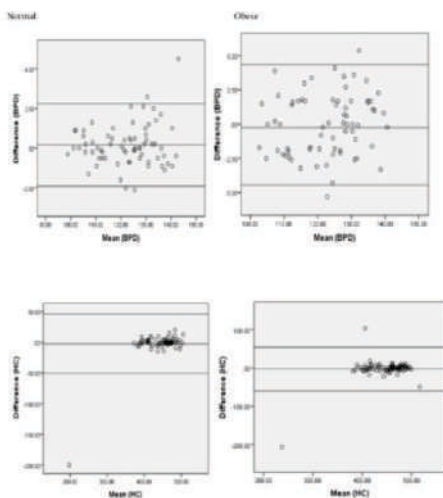
Variables	Cron Bach's Alpha	Inter Item Correlation	Inter Class Correlation Coefficient	P-value	T-sig.
BPD1-BPD2	0.972	0.946	0.972	0.000	0.928
HC1-HC2	0.688	0.525	0.677	0.000	0.488
AC1-AC2	0.927	0.865	0.926	0.000	0.194
FL1-FL2	0.966	0.934	0.966	0.000	0.323

Table 2: CronBach's Alpha Inter Item Correlation Inter Class Correlation Coefficient Its P-Value and T-test Significance for 70

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METHODS

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Figure 1: Bland Altman's plots; between the difference and the mean of values (BPD and HC) measured by both observers to all 70 normal and 70 obese
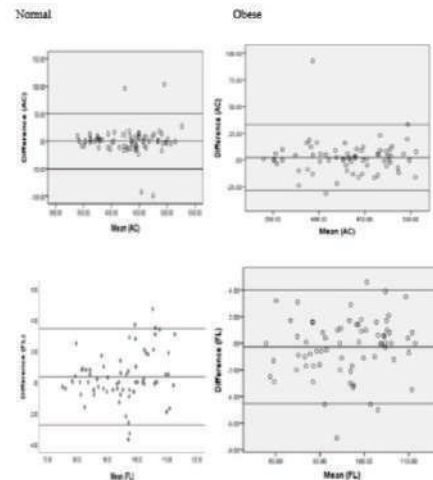
Figure 2: Bland Altman's plots; between the difference and the mean of values (AC and FL) measured by both observers to all 70 normal and 70 obese

DISCUSSION

This research was done to check the agreement between observers while measuring the fetal biometry at the level of third trimester gestation and compares the results of observers on two categories of BMI. BMI categories were normal and obese with help of this categorization effect of obesity was checked on measurements of observers taken for biometry. The determination of interobsserver reproducibility for fetal biometry 110 ladies with single gestation of 34 weeks or more were included. They categories pregnant ladies on their BMI while ignoring gestational weight gain. Cronbach's reliability coefficient was calculated for all categories but no significant difference found and values were strongly reliable Bland Altman's plots also showed strong agreement Fig1 and Fig2. Hence proved obesity doesn't affect negatively on fetal biometry [11]. When ultrasonography is performed in obese pregnant ladies counseling is needed to modify the reflect of limitation of standard USG and targeted USG. Just like after a normal USG evaluation, obese ladies still have 1% risk of the major anomalies including some are not detectable in USG scan. Their opinion was that obesity may cause hindrance to detect some major anomalies as well as cause problem in scans so that they said there is need to add some regular additional imaging to improve the results. Under results of my research my opinion is that the obesity is harmless in USG scanning because after repeated scan by two observers we found strong correlation between there results for every measurement regardless of obese or normal. Just have a look over the results of my study un which Cronbach's Alpha, inter item correlation, ICC and t-test their results for BPD, HC, AC and FL for 70 normal patients and 70 obese are given below in table 1 and 2 which suggest that there is no significant difference in both results and have strong relationship this means that there

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is strong relationship [16]. To demonstrate the inter obsever variability 140 fetuses were included that was single the difference is calculated to check the variability and they found significant difference between observers. The difference for values of interobserver variability was (± 4.9% or 0.99) to Head Circumference, (± 8.8% or 1.35) to Abdominal Circumference and (± 11.1% or 1.43) to Femur Length. While in this study difference is negligible so there is strong agreement present between both observers in both normal and obese categories that can be seen in given tables 1 and 2 [18-20].

CONCLUSION

Obesity causes many problems in sonographic fetal biometry. It was observed that the variation in normal and obese pregnant ladies in third trimester is not significant and a strong agreement between the observers in both normal and obese categories.

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