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Correlation between placental morphometry and maternal BMI in IUGR among Telangana population

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Abstract--- In newborns one of the major problems is fetal growth restriction or Intra Uterine Growth Restriction (IUGR) or morbidity and mortality. Objective of the study is to examine the correlation between the maternal BMI in IUGR and placental anthropometry. Materials and methods - Present study was conducted in OBG Department of SVS Medical College and hospital in September-2020-march-2021. Total 22 IUGR placental samples collected and compared with normal placenta and BMI correlated in both groups. Results - mean diameter of placenta in IUGR fetuses' range is 10.66-14.44; weight of placenta is 410.60 grams; hemoglobin level is 9.60 grams in IUGR pregnant women; BMI is 21.86 kg/m² and gestational age was 35.60 wks.

Keyword---morphometry, BMI, IUGR

Introduction

In newborns one of the major problems is fetal growth restriction or Intra Uterine Growth Restriction (IUGR) or morbidity and mortality. The objective of the study is to examine the correlation between maternal parameters such as body mass index (BMI), placental weight and diameter and their effects on fetal growth by using Ultrasonography on the outcome of growth restricted pregnancies. In the present study 22 cases of IUGR were compared with 22 normal pregnancies. Growth restricted fetuses were correlated with maternal anemia and malnutrition have significant association with the fetal growth restriction. Maternal anthropometry, such as low BMI and placental diameter which in turn, adversely affected fetal weight. Thus early USG screening along with maternal BMI can assist the obstetric team in providing early diagnosis and better outcome in IUGR pregnancies.

A growth restricted fetuses is one with an estimated fetal weight of less than the 10th percentile for that gestational age [1]. Prevalence of growth restricted fetuses is known to be about 10% [2]. In developed countries the incidence is 2-5% and in developing countries it's about 6-30%. [3, 4] the highest rate of prevalence of fetal growth restriction is found in Asia, followed by Africa and America [5, 6]. The factors affecting growth restriction are the nature of the etiological agents and duration of gestation [7]. Therefore having knowledge about these extrinsic factors, diagnosis, and prompt intervention and better management can leads for better growth in IUGR. In this present study, maternal anthropometric parameters such as body mass index (BMI) placental weight, diameter effecting the fetal growth. And also see the correlation of USG parameters on outcome of IUGR pregnancies.

Materials and Methods

This present study was carried out in the department of OBG after taking the institutional ethical committee clearance from the SVS Medical College and Hospital Mahbubnagar, Telangana state, India. Period of study was conducted between September 2020 to march 2021. Out of 430 deliveries 22 cases were growth restricted fetuses.

Statistical analysis

The statistical analysis was performed utilizing Microsoft Excel (Version 2010) and SPSS software (chi-square test) and p value < 0.05 was considered statistically significant.

Results



Fig. measuring the placental diameter in by using the vernier caliper

Placental diameter mean values in IUGR fetus maximum diameter is 14.44 ± 3.62 cms and minimum diameter mean value is 10.66 ± 1.26 cms (Table 1 and Graph 1).

Table 1
Comparison the diameter of Placenta

Diameter of placenta (cms)	Normal fetus Mean \pm SD (n=22)	IUGR fetus Mean \pm SD (n=22)
Maximum	16.90 ± 2.40	14.44 ± 3.62
minimum	12.43 ± 2.24	10.66 ± 1.26

Graph - 1. Diameter of the placenta

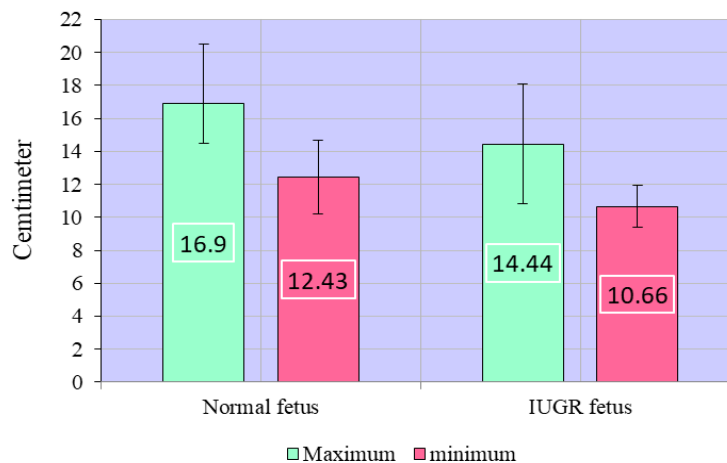


Table 1 demonstrates minimum and maximum diameter of the placenta of normal fetuses and IUGR fetuses. Each vertical bar represents Mean, and error bars denoting Standard deviation. IUGR

Intra Uterine Growth Restriction

Normal weight of placenta in present study observed that 540.20 ± 96 grms. And in IUGR fetus weight is 410.60 ± 80.66 grams (Table 2 and Graph 2).

Table 2
Comparison the Weight of placenta

	Normal fetus Mean \pm SD (n=22)	IUGR fetus Mean \pm SD (n=22)
Weight of placenta (grms)	540.20 ± 96.80	410.60 ± 80.66

Graph - 2. Weight of the placenta

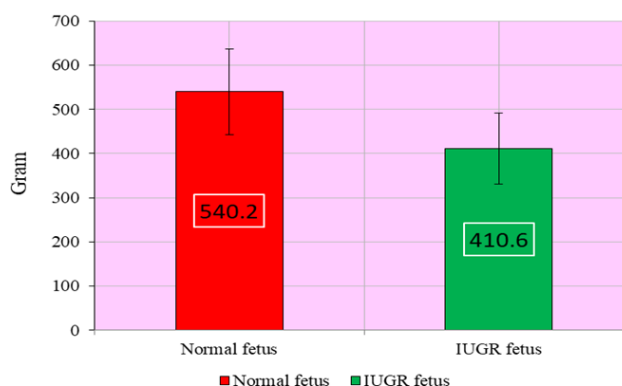


Table 2 shows weight of the placenta of normal fetuses and IUGR fetuses. The columns represent Mean, and error bars denote Standard deviation. IUGR - Intra Uterine Growth Restriction. In present study hemoglobin levels are noticeably decreased in IUGR pregnant women when compare to the normal pregnant women hemoglobin level. The hemoglobin values are presented in Table 3 and Graph 3.

Table 3
Comparison of hemoglobin in study groups

	Normal pregnant women Mean \pm SD (n=22)	IUGR pregnant women Mean \pm SD (n=22)
Hemoglobin (g/dl)	11.5 ± 1.12	9.60 ± 1.26

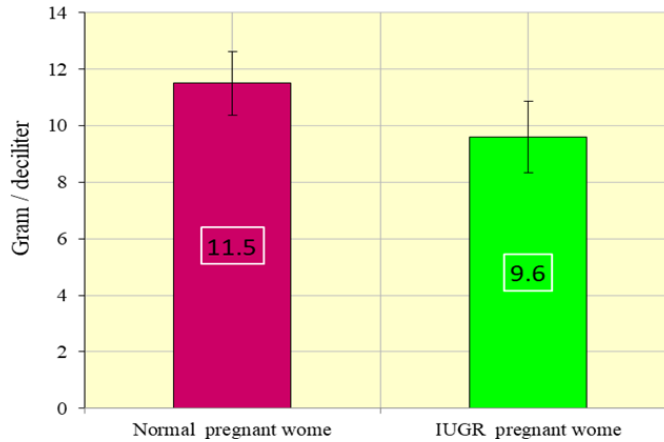
Graph - 3. Haemoglobin level

Table 3 exhibits comparison of hemoglobin level of normal pregnant women and IUGR pregnant women. The columns represent Mean, and error bars denoting Standard deviation. IUGR - Intra Uterine Growth Restriction. Normal pregnant women BMI is 25.86 ± 1.76 kg/m². And in IUGR pregnant women BMI is 21.86 ± 1.96 kg/m² (Table 4 and Graph 4). The Body mass index (BMI) is reduced in IUGR pregnant women.

Table 4
Comparison of BMI in study groups

	Normal pregnant women Mean + SD (n=22)	IUGR pregnant women Mean + SD (n=22)
Body mass index (BMI) Kg/m ²	25.86 ± 1.76	21.86 ± 1.96

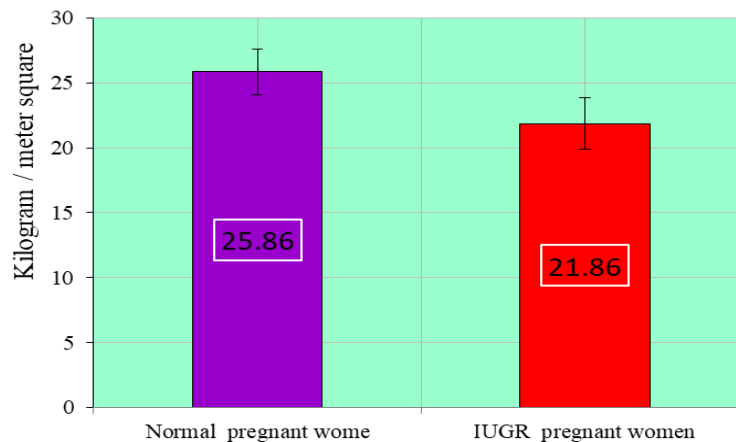
Graph - 4. Body mass Index

Table 4 displays comparison of Body Mass Index (BMI) of normal Normal pregnant women and IUGR pregnant women. The columns represent Mean, and error bars denoting Standard deviation. IUGR - Intra Uterine Growth Restriction.

Table 5
Comparison of gestational age (GA) using ultrasonography (USG) in study groups

	Normal fetus Mean \pm SD (n=22)	IUGR fetus Mean \pm SD (n=22)
gestational age (GA) in weeks	38.22 \pm 1.30	35.60 \pm 2.80

Graph - 5. Gestational age

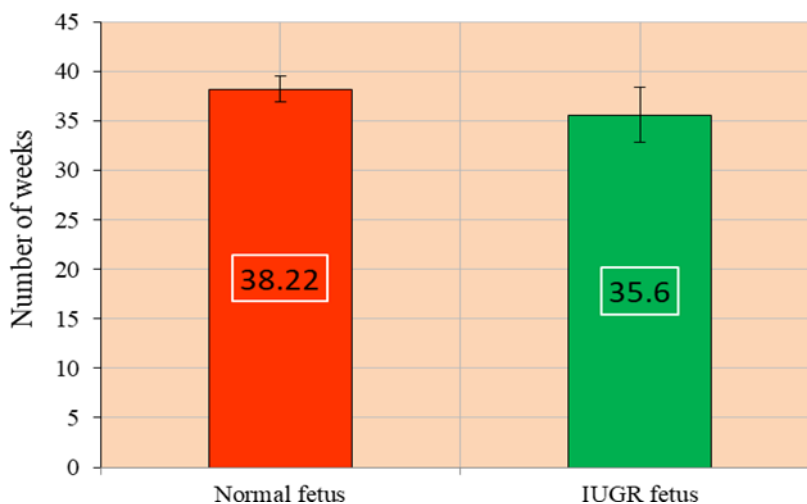


Table 5 shows comparison of gestational age (GA) of normal fetuses and IUGR fetuses using ultrasonography (USG). The columns represent Mean, and error bars denoting Standard deviation. IUGR - Intra Uterine Growth Restriction. gestational age (GA) is detected by using ultrasonography (USG). In normal pregnancies GA is 38.22 \pm 1.30 weeks whereas in IUGR pregnancies the GA is 35.60 \pm 2.80 weeks (Table 5 and Graph 5). Gestational age (GA) of IUGR fetuses is moderately reduced when compare with normal fetuses.

Discussion

Utilizing the USG screening early diagnosis, better management and better outcome in IUGR babies. Placental parameters like weight and diameter were significantly reduced in the present study, where the pregnant women's BMI and hemoglobin levels are low compared with normal. Previous studies showed that since USG was used as a diagnostic tool to monitor fetal growth restricted fetuses. This was reflected as number increase in the number of cases of fetal growth restriction in premature infants [13]. Hemoglobin levels in IUGR pregnancies showed a mean 9.60 % compared with mean of 11.50% normal pregnancies. In comparison with maternal BMI in the study groups mean BMI in normal pregnant women was 25.86, whereas in IUGR mother was having 21.86. BMI has a critical role in intra uterine growth. Maternal anthropometries on birth

weight are likely mediated through the effects of maternal anthropometry on placental volume [16].

In this present study, we found a strong correlation between fetal weight and placental diameter as well as placental weight. Fetal and placental values are directly proportional to each other. Placental insufficiency leads to a syndrome of a fetal weight defect [16]. When the fetus is small the placenta being a fetal organ shows diminished growth along with the reduction in the placental weight [17, 18]. According to R. Gershon and L. Strauss, placenta in growth restricted fetuses also stated that majority of placenta shows fibrin deposits, infarcts, and over growth of trophoblastic tissue and also noticed that nonspecific inflammation of placental villi with loss of vascularity with the apparent site of injury being placental syncytiotrophoblast layer [16]. Found that more frequently infiltrated with leukocytes [19]. In those kinds of placentas, the blood vessels were seen occluded due to deposits leads to ischemic damage to placental tissue. Similar placental infarcts were commonly found in women with hypertension [20, 21].

Conclusion

Above results stating that early screening of pregnant women for BMI, gestational age, anemia and gestational age using USG can effectively decrease Intrauterine growth restriction (IUGR). However, results of the present study showing the importance of early detection of USG alterations and BMI and other anthropometric parameters and anemia on fetal growth restriction. And FGR is one of the manageable obstetric complications if we detect well in advance. Therefore, the strength of the study is that the implication of USG screening in the management of FGR in terms of achieving early detection and prompt intervention, thereby reducing perinatal fetal morbidity and mortality.

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