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CORRELATION BETWEEN ULTRASONOGRAPHIC ESTIMATED FETAL WEIGHT AND MODE OF DELIVERY AMONG THE NULLIPAROUS DIABETIC PREGNANT WOMEN WITH FETAL OUTCOME

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ABSTRACT

Background: The management of pregnant women with diabetes is a critical aspect of prenatal care, necessitating vigilant monitoring and individualized decision-making to ensure the best possible fetal and maternal outcomes. Ultrasonographic estimation of fetal weight has become an indispensable tool in obstetric practice ,offering a non –invasive means to assess fetal growth and well-being. Ultrasound plays a crucial role in managing pregnancies complicated by diabetes. In particular, ultrasound can accurately estimate fetal weight, which helps in determining the optimal timing and mode for delivery. Association between estimated fetal weight and fetal outcomes is also crucial for optimizing prenatal care and delivery management. **OBJECTIVE**: To Correlate between ultrasonographic estimated fetal weight and mode of delivery in nulliparous diabetic pregnant women with fetal outcome. **METHODS**: Our study was a time bound, hospital based and cross-sectional observational study done in the Department of Radio-diagnosis, M.G.M. Medical College and M.Y. Hospital Indore, Madhya Pradesh, India. During Obstetric Ultrasound, Fetal weight was recorded with gestational age of more than 34 weeks. Post delivery, fetal outcomes were assessed. **RESULTS**: Out of total 104 pregnant nulliparous diabetic women, majority 46 (44.2%) of patients belonged to the age group of 25-30 years of age. The mean age group of patients was 25.83 ± 2.6 years. Among the 104 pregnant women, the majority of 51 (49%) women underwent cesarean section delivery, while 45 (43%) women had normal vaginal delivery and a smaller subset of 8 (7.6%) women underwent instrumental delivery. majority of 60 (57.6%) fetuses were considered as appropriate for gestational age, 35 (33.6%) patients were considered large for gestational age and 9 patients (9.6%) as small for gestational age. The correlation between ultrasonographic estimated fetal weight and mode of delivery was noticeable in diabetic nulliparous pregnant women. **CONCLUSION**: We found that that utilizing ultrasound for estimating fetal weight may lead to an increased likelihood of cesarean delivery. Thus, ultrasound

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can accurately estimate fetal weight, which helps in determining mode for delivery and also provides detailed information about fetal growth patterns and potential abnormalities which allows for timely interventions reducing the adverse effects of maternal diabetes on pregnancy.
KEYWORDS: estimated fetal weight, pregnant women, mode of delivery.

INTRODUCTION

Pregnancy is dynamic and complex physiological state during which numerous maternal and fetal factors influence the course of gestation and delivery. Among these factors , maternal diabetes mellitus specifically in nulliparous women represent a distinct challenge due to its potential impact on fetal growth and the mode of delivery. The management of pregnant women with diabetes is a critical aspect of prenatal care, necessitating vigilant monitoring and individualized decision-making to ensure the best possible fetal and maternal outcomes. Ultrasound plays a crucial role in managing pregnancies complicated by diabetes. In particular, ultrasound can accurately estimate fetal weight, which helps in determining the optimal timing and mode for delivery. It also provides detailed information about fetal growth patterns and potential abnormalities which allows for timely interventions reducing the adverse effects of maternal diabetes on pregnancy outcomes.
By incorporating ultrasound and comprehensive prenatal care healthcare providers can effectively manage diabetic pregnancies. Thereby, reducing maternal and perinatal morbidity and mortality rates. This study was done to understand how estimating fetal weight using ultrasound correlates to the mode of delivery and fetal outcome. This knowledge can improve prenatal care and helps the obstetricians in deciding the safest way to deliver the baby. The aim behind this study was to correlate the mode of delivery and fetal outcome in nulliparous diabetic pregnancies using ultrasound estimated fetal weight and also to correlate ultrasound estimated fetal weight with the actual birth weight.

MATERIAL AND METHODS

A time bound, hospital based and cross-sectional observational study, was conducted in the Department of Radio-diagnosis, M.G.M. Medical College and M.Y.Hospital Indore, Madhya Pradesh, India after receiving approval from Institutional Scientific and Ethics Committee. The duration of the study was one year from ethics committee clearance. A total of 104 patients who were clinically diagnosed as Diabetic and referred to the Department of Radiodiagnosis were included in the study.
INCLUSION CRITERIA: Pregnant Nulliparous Diabetic women with Gestational age of >34 weeks were included in this study.

EXCLUSION CRITERIA : Multiparous Pregnant Women, Pregnant Women with any other systemic illness or having any type of placental and Fetal anomaly were excluded from this study.

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STUDY PROTOCOL: Pregnant Women was recruited in the study after PCPNDT registration, detailed history, clinical examination and Diabetic examination as per standard protocol. It was followed by informed consent after a complete description of study and handling over patient information sheet. All patients will be examined in supine position using a low frequency transducer (3.5MHz) which provides adequate penetration and adequate resolution image. Scanning was done both in Transverse and longitudinal planes.

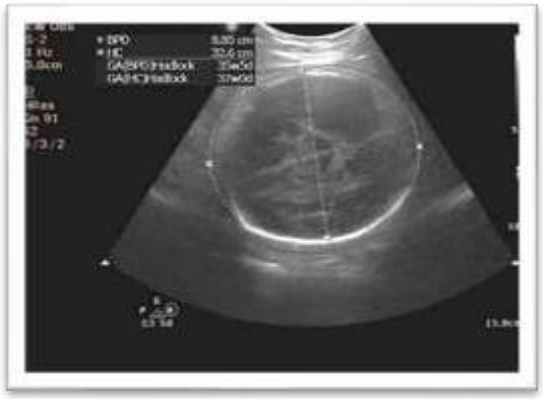

Fig A: Biparietal Diameter

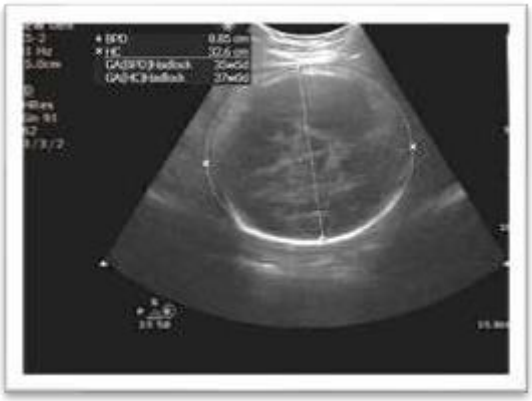

Fig B : Head Circumference

Fig C : Abdominal Circumference

Fig D : Femur Length

BPD together with HC, AC, and FL were computed using hadlock's formula to produce an estimate of fetal weight. During Obstetric Ultrasound, Fetus weight was recorded with gestational age of more than 34 weeks. Post delivery, Birth weight of the Baby and APGAR Score was noted.

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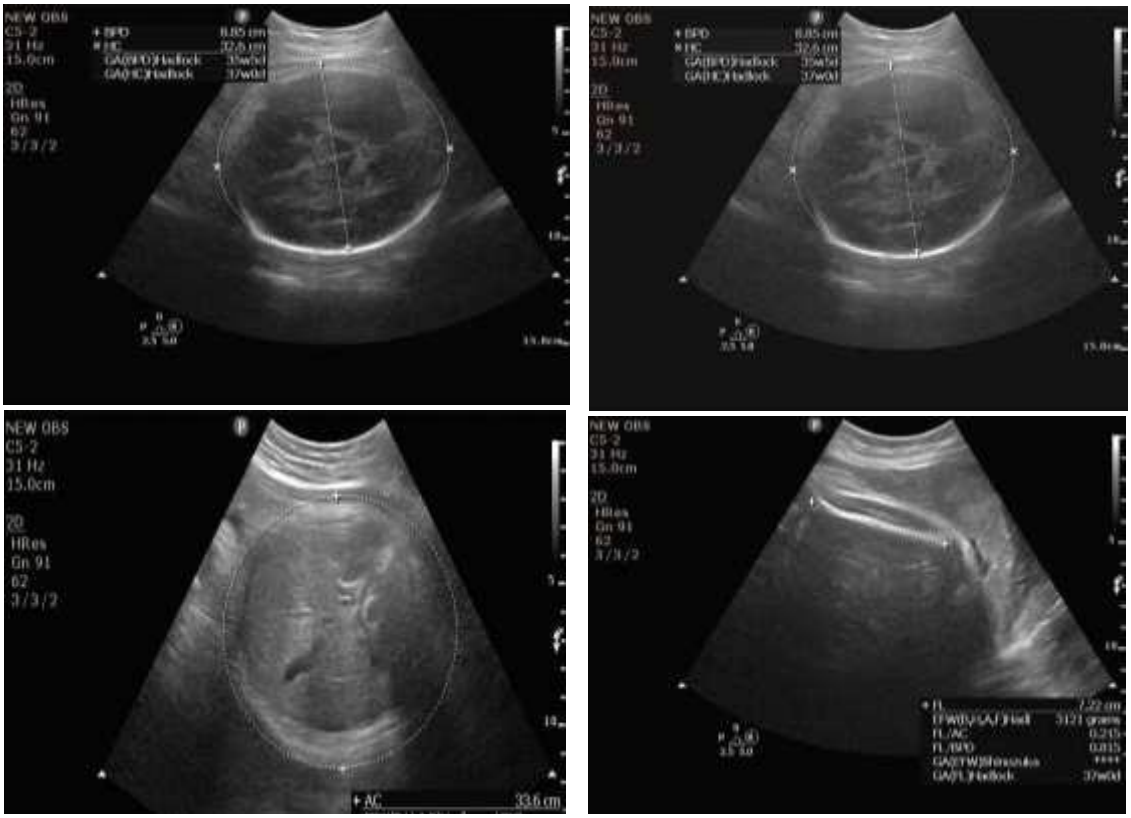
STATISTICAL ANALYSIS: Variables such as fetal weight was expressed using mean and standard deviation. Correlation was evaluated using Analysis of Variance (ANOVA) and Pearson correlation. Data is considered significant at 5% level of significance (p-value<0.05). Statistical Package for the Social Sciences (SPSS) software version 25.0 was used for statistical analysis.

Figure 1



30 year old Primigravida pregnant diabetic women with GDM at 37 weeks GA with US- EFW of 3.19kg underwent instrumental delivery and actual birth weight was 3kg and APGAR at 5 min was 8.

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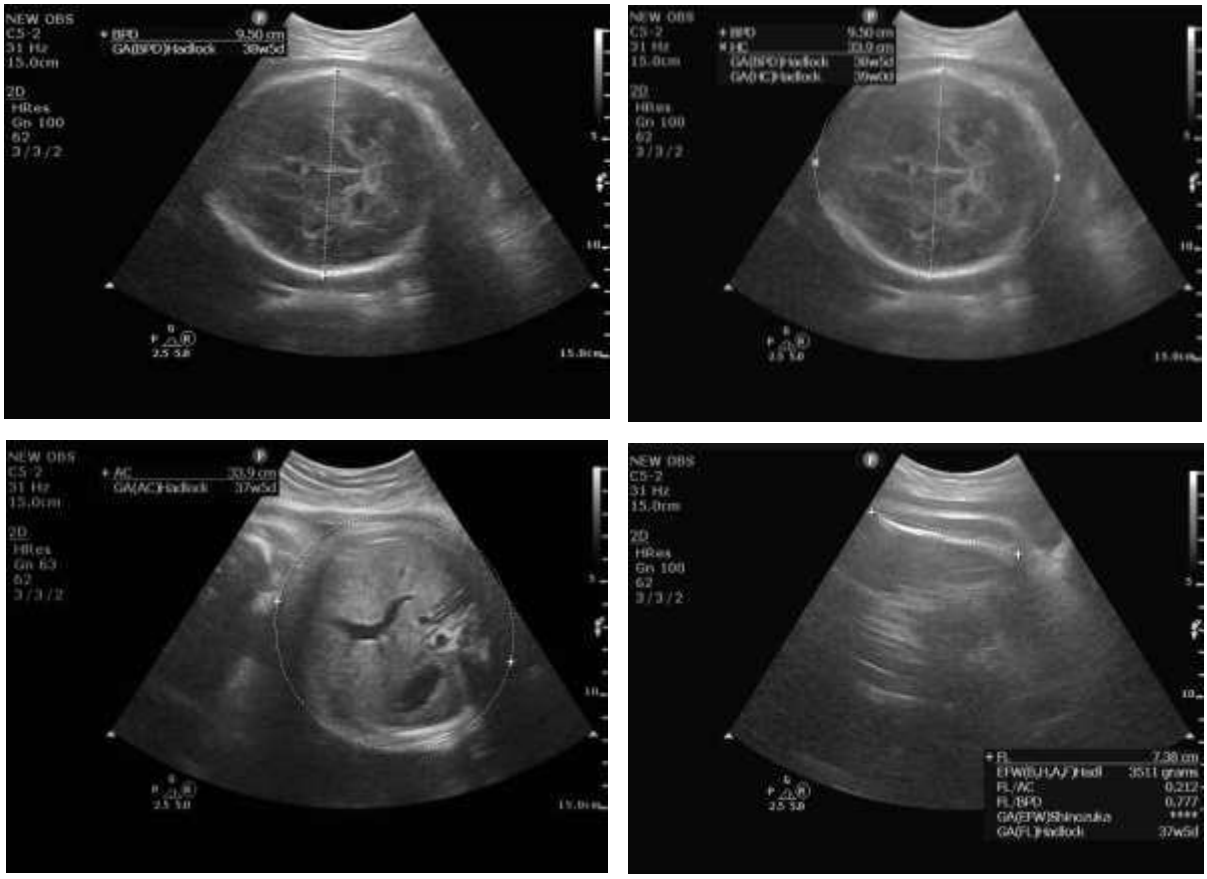
Figure 2



25 year old primigravida pregnant woman with GDM at 38 weeks gestational age With US-EFW of 3.6kg underwent caesarean delivery with actual birth weight of 3.8kg and APGAR score was 4.

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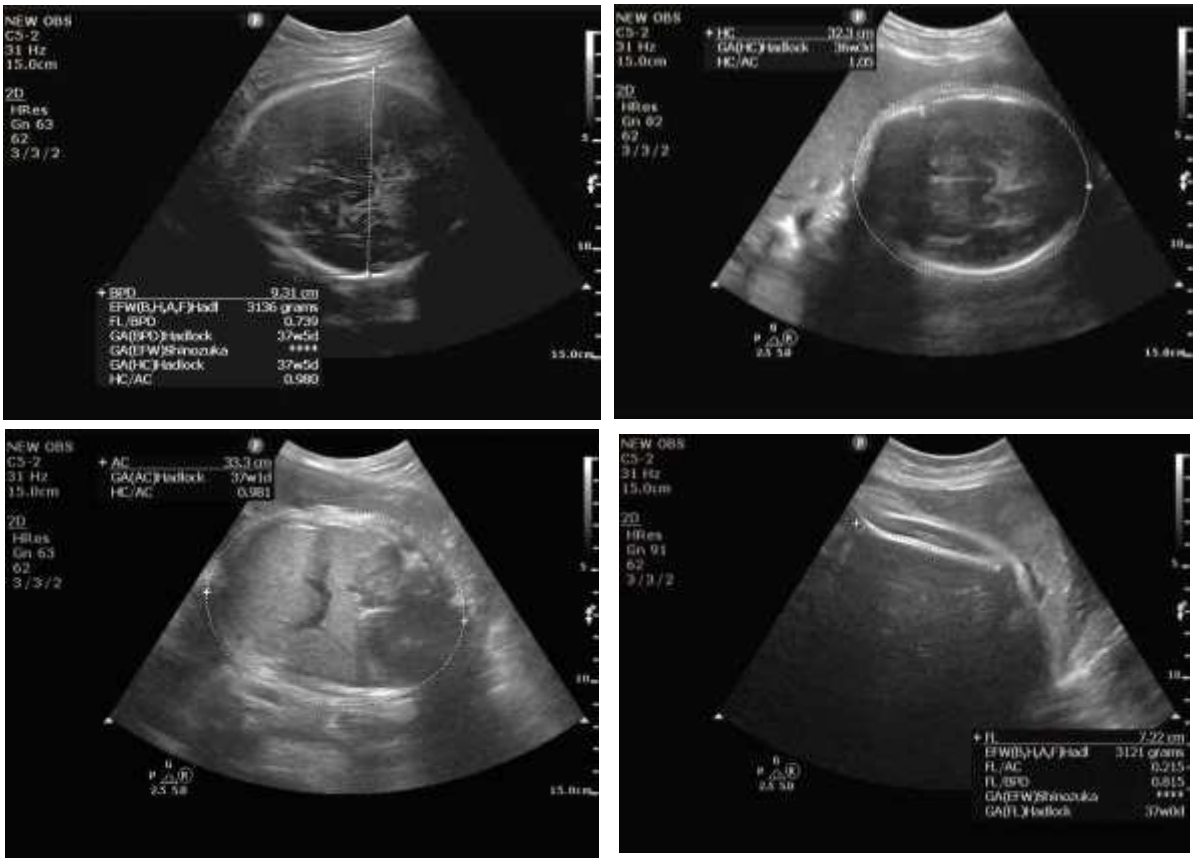
FIGURE 3



30 year old nulliparous pregnant women with GDM at 36 weeks with US-EFW of 3.2kg underwent vaginal delivery with actual birth weight of 3kg and APGAR score of 7.

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RESULTS

Out of total 104 pregnant nulliparous diabetic women, majority 46 (44.2%) of patients belonged to the age group of 25-30 years of age. The mean age group of patients was 25.83 ± 2.6 years. In our study, majority of 61 (58.6%) women were between 36.1 and 38 weeks gestational age followed by 23 (22.1%) women were between 34 and 36 weeks and 20 (19.2%) women were between 38.1 and 40 weeks.

Among the 104 pregnant women, majority of 60 (57.6%) fetuses were considered as appropriate for gestational age, 35 (33.6%) patients were considered large for gestational age and 9 patients (9.6%) as small for gestational age.

The majority of 51 (49%) women underwent cesarean section delivery, while 45 (43%) women had normal vaginal delivery and a smaller subset of 8 (7.6%) women underwent instrumental delivery. There were 16 patients who were appropriate for gestational age but underwent caesarean sections because of complications like PROM, Polyhydramnios Oligohydramnios or prolonged labour at the time of delivery. After delivery, as per the actual birth weight, 29 (27.8%) were considered LGA. While 69 (66.3%) were considered AGA and 6 (5.7%) were considered SGA.

In our study, 30 (28.8%) newborns had APGAR scores ranging from 0 to 5 at 1 minute post-birth, indicating a moderate level of well-being. Additionally, 74 (72.2%) newborns received APGAR scores greater than 6, suggesting they were in good overall condition. At 5 minutes post-birth, 22 (21.1%) newborns had APGAR scores ranging from 0 to 5, while the majority of 82 (79.7%) newborns had scores greater than 6, reflecting good overall health and vitality.

TABLE 1: Correlation between ultrasonographic estimated fetal weight (US-EFW) and actual birth weight (ABW) according to LGA, AGA and SGA

	LGA (US-EFW)	AGA (US-EFW)	SGA (US-EFW)	LGA (ABW)	AGA (ABW)	SGA (ABW)
No. of Patients	35	60	9	29	69	6
Percentage	33.4%	57.6%	9%	27.8%	66.3%	5.7%

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Among the patients, there were 35 (33.4%) patients categorised as LGA and 60 (57.6%)patients as AGA as per Ultrasound estimated fetal weight. As per actual birth weight, there were 29 (27.8%) patients categorised as LGA and 69 (66.3%)patients as AGA.

TABLE 2: Distribution of patients according to mode of delivery.

MODE OF DELIVERY	NO. OF PATIENTS	PERCENTAGE
CESAREAN	51	49%
VAGINAL	45	43.3%
INSTRUMENTAL	8	7.7%
TOTAL	104	100%

Among the patients, the majority of 51 patients underwent Caesarean section delivery. Following this, 45 patients had a vaginal delivery, while a smaller subset of 8 patients underwent instrumental delivery.

TABLE 3: Correlation between APGAR scores at 1 min, 5 min and NICU admissions

SCORES	APGAR at 1 min	APGAR at 5 min	NICU admission
0-5	30 (29%)	22 (21%)	22 (21%)
6-9	74 (71%)	82 (79%)	82 (79%)
Total	104	104	104

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30 (28.8%) newborns had APGAR scores ranging from 0 to 5 at 1 minute and 74 (72.2%) newborns received APGAR scores greater than 6. Similarly, at 5 minutes post-birth, 22 (21.1%) newborns had APGAR scores ranging from 0 to 5, while the majority of 82 (79.7%) newborns had scores greater than 6 and they required NICU admission.

TABLE 4: Correlation between US-EFW and Actual birth weight with respect to mode of delivery

Mode of Delivery	r- value	p-value
Vaginal	0.90	<0.001
Cesarean	0.96	<0.001
Instrumental	0.82	<0.001

For Caesarean deliveries, there is a very strong positive correlation between Actual Birth Weight and US-EFW, with a r-value of 0.96. For Instrumental deliveries, The r-value is 0.82, although slightly lower than Caesarean deliveries, this correlation is still significant ($p < 0.001$). For Vaginal deliveries, there is also a strong positive correlation between Actual Birth Weight and US-EFW, with a r-value of 0.90. All correlation are statistically significant.

DISCUSSION

Out of 104 patients, majority of 51 (49%) women underwent cesarean section delivery, while 45 (43%) women had normal vaginal delivery and a smaller subset of 8 (7.6%) women underwent instrumental delivery. There were 16 patients who were appropriate for gestational age but underwent caesarean sections because of complications like PROM, Polyhydramnios, Oligohydramnios or prolonged labour at the time of delivery. It was due to higher chance of having a larger than average fetus and a higher likelihood of shoulder dystocia, which makes vaginal birth difficult and necessitates caesarean delivery for the majority of pregnant diabetic women.

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Patients with well controlled blood sugar levels and normal estimated fetal weight underwent Vaginal deliveries and few larger than average head size cases underwent instrumental deliveries.

In our study, majority of 60 (57.6%) fetuses were considered as appropriate for gestational age, 35 (33.6%) patients were considered large for gestational age and 9 patients (9.6%) as small for gestational age. This was due to improved diabetic management and regular monitoring of fetal growth helps in reducing the risk of having a larger than gestational age fetus. After delivery, as per the actual birth weight, 29 (27.8%) were considered LGA. While 69 (66.3%) were considered AGA and 6 (5.7%) were considered SGA. This was due to the fact that in diabetic pregnancies, it is possible for the fetus to have a larger than average head size which affects the measurements of BPD and HC leading to some overestimated LGA cases. Similarly, near term there is an increase in the growth rate of fetus which can contribute to a increase in weight gain leading to few underestimated SGA cases.

In our study, 30 (28.8%) newborns had APGAR scores ranging from 0 to 5 at 1 minute post-birth, indicating a moderate level of well-being. Additionally, 74 (72.2%) newborns received APGAR scores greater than 6, suggesting they were in good overall condition. At 5 minutes post-birth, 22 (21.1%) newborns had APGAR scores ranging from 0 to 5, while the majority of 82 (79.7%) newborns had scores greater than 6, reflecting good overall health and vitality. In our study, 22 (21.1%) newborns were required NICU admission, indicating the need for specialized medical care and monitoring due to various medical conditions or complications at birth and rest 82 (78.8%) individuals had required no admission in NICU. Newborns of diabetic mothers are at increased risk of respiratory distress, hypoglycemia, hyperbilirubinemia etc. Therefore, they are often closely monitored in the neonatal intensive care unit to ensure early detection and management of any complication.

In our study, there is a very strong positive correlation between Actual Birth Weight and US-EFW with caesarean, vaginal and instrumental delivery with r-value of 0.96, 0.90 and 0.82 respectively and the correlation is statistically significant ($p < 0.001$).

LIMITATIONS

Acknowledging the limitations of this study, such as its sample size and potential biases, is important, as they could have affected the results. But this gives us ideas for future research. If we do larger studies with different types of patients, we can get even more solid evidence of how ultrasound estimated fetal weight can affect mode of delivery.

CONCLUSION

We found that that utilizing ultrasound for estimating fetal weight may lead to an increased likelihood of cesarean delivery. Thus, ultrasound can accurately estimate fetal weight, which helps in determining mode for delivery and also provides detailed information about fetal growth

patterns and potential abnormalities which allows for timely interventions reducing the adverse effects of maternal diabetes on pregnancy.

Abbreviations : US-EFW – ultrasonographic estimated fetal weight, ABW- Actual birth weight, LGA- large for gestational age, SGA- small for gestational age, AGA- appropriate for gestational age, GDM- gestational diabetes mellitus

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