

Article

The Role of Ultrasound in Detecting Fetal Findings in Pregnant Women

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Abstract: Ultrasound screening is widely recommended for detecting congenital defects, multiple pregnancies, fetal development issues, placental abnormalities, and gestational age discrepancies, all of which can improve perinatal outcomes. This study aimed to investigate the significance of ultrasound techniques in assessing fetal outcomes in pregnant women. A total of 93 women aged 20 to 42 were examined across hospitals in Iraq between February 2023 and March 2024. Each participant underwent ultrasound screening at 15-22 weeks and 30-35 weeks of gestation, and fetal outcomes were assessed in terms of mortality, morbidity, heart rate, and adverse conditions. The most common age group (31-40 years) included 48 cases, and 20.43% were smokers. Adverse outcomes included 5 infant deaths, 12 cases of moderate morbidity, 4 of severe morbidity, 4 chromosomal abnormalities, 3 cases of oligohydramnios, and 2 of polyhydramnios. Ultrasound, being a safe and non-invasive procedure, offers significant benefits in pregnancy by enabling the early assessment of fetal outcomes, thus improving maternal and infant health.

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1. Introduction

In general, ultrasound is used as an essential test in the prenatal diagnosis and study of pathologies related to women's health [1]. In the case of prenatal diagnosis, thanks to the series of ultrasounds performed during pregnancy, the intrauterine development of the baby can be evaluated, so it is vital from a medical point of view, but it has also meant a whole revolution at a social level allowing parents to see their child and hear his heartbeat before birth. [2,3,4]

Despite the social value that prenatal ultrasound has acquired, its main objective is to provide information about the state and development of the baby, including the early detection of malformations, evaluate the anatomical development of the fetus [5,6], its growth, its position, calculate its gestational age, evaluate heart rhythms, observe the state of the placenta, amniotic fluid, estimate the baby's weight and detect pregnancy abnormalities or pathologies [7]. During pregnancy, between prenatal care, doctors recommend performing between three and four ultrasounds or ultrasounds to see the evolution of the baby at the different stages of its gestation.

The most commonly used ultrasound during pregnancy is obstetric ultrasound, which is complemented by gynecological pelvic ultrasound and 3D ultrasound. The procedure of an obstetric ultrasound poses no risk to the health of the mother or baby [8,9,10,11]. This ultrasound is performed through the mother's abdomen with the help of an ultrasound scanner, which consists of three parts: an exploratory probe or transducer, a processing unit, and a monitor [12,13,14]. To perform the obstetric ultrasound, the mother lies on a stretcher with her abdomen uncovered while the specialist doctor applies a conductive gel that blocks the air intake and facilitates the exploratory probe to move and can receive ultrasonic waves that are returned from inside the mother's body once they collide with a tissue [15,16,17,18]. The reflective waves are taken by the unit, which throws the final image that can be observed through the monitor. In gynecobstetrics, the obstetric ultrasound is performed after 11 weeks of gestation; before this date, the ultrasound that yields the best results is the gynecological pelvic ultrasound. With obstetric ultrasound between 11 and 14 weeks of gestation, the markers of chrestomathies can be determined. One of them is the fetal translucency test, with which it is detected if the fetus is at risk of presenting the chromosomal alteration that causes Down syndrome. [20,21,22,23,24,25]

In the second trimester, obstetric ultrasound is very useful to evaluate the biometrics of the fetus [26]. In addition to taking measurements of the head, abdominal circumference, femoral length, weight and the position in which the baby is, it also helps in the analysis and study of the placenta and amniotic fluid. Thus being an ideal tool to verify the proper development of pregnancy. [27]

2. Materials and Methods

A total of 93 pregnant women, aged between 20 and 42 years, were enrolled in different hospitals in Iraq over the course of the study, which spanned from February 2023 to March 2024. The study excluded women with diabetes, heart disease, kidney disease, and those younger than 20 or older than 42 years of age. Conversely, the study included women with hypertension and women who were obese. The demographic and basic characteristics of the pregnant women were recorded, including age, body mass index (underweight, normal weight, overweight, and obese), smoking exposure, previous medications, education, and economic status. The clinical outcomes and characteristics of pregnant women and fetuses were recorded using the statistical software package SPSS, version 22.0.

All clinical examinations of the women were conducted during the course of their pregnancies. All pregnant women underwent a perinatal ultrasound examination between 15 and 22 weeks of gestation, followed by another examination between 30 and 35 weeks. A series of medical examinations were conducted on pregnant women, with the objective of determining the fetal outcomes in terms of mortality, morbidity, heart rate, and the occurrence of adverse fetal outcomes. The medical history of the patient was recorded, including details of previous pregnancies, the type of pregnancy, whether the patient had experienced a miscarriage, whether the miscarriage was induced, and the weight of the fetus at the time of delivery. The occurrence of adverse fetal outcomes, including mortality, morbidity, and fetal malformations, was established.

During the perinatal period, a biophysical profile (BPP) was determined to assess fetal movements in terms of duration (less than 10 minutes, 10 minutes to 30 minutes, more than 30 minutes), muscle tone (hypotonia, normotonia, hypertonia), fetal heart rate (bradycardia, less than 110 beats per minute, normal heart rate, 110 to 160 beats per minute, tachycardia, greater than 160 beats per minute) and fetal amniotic fluid (oligohydramnios, norm hydramnios, polyhydramnios).

3. Results

Table 1. Demographic Characteristics of Pregnant Women

<i>Characteristics</i>	<i>Cases, (n = 93)</i>	<i>Percentage, %</i>
<i>Maternal Age</i>		
20 – 30	25	26.88%
31 – 40	48	51.61%
> 40	20	21.51%
<i>BMI (kg/m²)</i>		
<i>Underweight, < 18.5</i>	19	20.43%
<i>Normal weight, 18.5 – 24.9</i>	35	37.63%
<i>Overweight, 25.0 – 29.9</i>	30	32.26%
<i>Obesity, > 30.0</i>	9	9.68%
<i>Current smoking</i>		
Yes	19	20.43%
No	74	79.57%
<i>Medication used</i>		
Yes	41	44.09%
No	52	55.91%
<i>Education status</i>		
<i>Primary</i>	16	17.20%
<i>Secondary</i>	34	36.56%
<i>Post-graduated university</i>	43	46.24%
<i>Income status, \$</i>		
< 425	36	38.71%
425 – 630	40	43.01%
> 630	17	18.28%

Table 2. Diagnoses Findings of Pregnancy History in Pregnant Women and Infants

Variables	Cases, (n = 93)	Percentage, %
<i>Previous pregnancy</i>		
0	30	32.26%
1	44	47.31%
≥ 2	19	20.43%
<i>Types of Pregnancy</i>		
<i>Singular</i>	89	95.7%
<i>Twin</i>	4	4.3%
<i>Miscarriage</i>		
0	9	9.68%
≥ 1	3	3.23%

<i>Induced abortion</i>		
0	6	6.45%
≥ 1	2	2.15%
<i>Live - born infant, kg.</i>		
< 2.20	3	3.23%
2.20 - 4.0	78	83.87%
> 4.0	12	12.9%

Table 3. Enrolling Mortality and Morbidity of Fetal

Items	Cases, (n = 93)	Percentage, %
<i>Death</i>		
Yes	5	5.38%
No	88	94.62%
<i>Morbidity</i>		
None	77	82.8%
Moderate	12	12.9%
Severe	4	4.3%

Table 4. Detection of Fetal Abnormalities by Ultrasound

Variables	Cases, (n = 93)	Percentage, %
Spina bifida	1	1.08%
Chromosomal abnormalities	4	4.3%
Cardiac abnormalities	2	2.15%
Limb abnormalities	0	0.0%
Hydronephrosis	1	1.08%
Diaphragmatic hernia	2	2.15%

Table 5. Biophysical Profile (BPP) Outcomes

Variables	Cases, (n = 93)	Percentage, %
Duration for 10 Fetal Movements		
< 10 min	3	3.23%
10 – 30 min	7	7.53%
≥ 30 min	83	89.25%
Fetal muscle		
Hypotonic	6	6.45%
Normal tone	85	91.4%
Hypertonic	2	2.15%
Fetal heart rate		
Bradycardia, < 110	7	7.53%
Normal heart rate, 110 – 160	82	88.17%
Tachycardia, > 160	4	4.3%
Fetal amniotic fluid		
Oligohydramnios	3	3.23%
Normal Amniotic Fluid	88	94.62%
Polyhydramnios	2	2.15%

4. Discussion

Ultrasound imaging has become indispensable in the evaluation of pregnancy complications. This technique is considered safe as it employs sound waves to generate images of the baby within the mother [28]. In addition, such magnification demonstrates other important fetal findings, for instance, genetic defects. The excess or deficient volume of amniotic fluid may suggest an underlying problem concerning the fetus. [29,30]

Earlier investigations into the use of ultrasound screening have shown enhanced diagnostic results, such as the ability to diagnose multiple pregnancy earlier and correction of inaccurately assigned gestational ages, among others, and have revealed different impacts of ultrasound screening on treatments like etiology and duration of hospital stay [31]. These diagnostic interventions and the resultant therapy impacts reduce perinatal and neonatal morbidity and mortality. In addition, ultrasound can be used to evaluate important fetal parameters such as congenital defects. [32,33]

They include structural defects like spina bifida or congenital heart diseases and chromosomal abnormalities like Down's syndrome [34]. Early detection of such anomalies means that healthcare workers can offer adequate counselling and treatment to the parents. Alterations in the level of amniotic fluid, whether it be deficiency or excess, may suggest fetal well-being risks, and further assessments may be needed. [35]

5. Conclusion

The use of ultrasound during pregnancy is considered important in spotting fetal findings, which consequently improves maternal and fetal outcomes. These interventions and the therapy that follows them help reduce perinatal and neonatal morbidity and mortality. An abnormal volume of amniotic fluid, either less or more than the normal range, may indicate dangers to the well-being of the fetus, and further evaluation may be warranted.

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