Evaluating the Quality of Ultrasound Examinations for Iraqi Women Aged 20 to 35 Years at the Beginning of Pregnancy

Dr. Afrah Naser kadhim Almusawi

M.B.Ch.B., D.G.O., C.A.B.O.G. \ (Obstetrics & Gynecology) Specialist Obesterics and Gynogology Iraqi Ministry of Health, Baghdad Medical office Al-Karkh, Al-Karama Teaching Hospital, Baghdad, Iraq

Dr. Rawya Mansoor Abdullah

M.B.Ch.B., D.G.O., C.A.B.O.G. \ (Obstetrics & Gynecology) Specialist Obesterics and Gynogology Iraqi Ministry of Health, Baghdad Medical office Al-Karkh, Al-Karama Teaching Hospital, Baghdad, Iraq

Dr. Seenaa Ali Hussein

M.B.Ch.B., D.G.O. (Obstetrics and Gynecology) Iraqi Ministry of Health, Babylon Health Directorate, Mahawil General Hospital, Babylon, Iraq

Abstract: Background: Ultrasound scan was performed on pregnant women to identify an increased risk of problems for the mother and fetus. Objective: The aim of the study is to assess and determine clinical outcomes of Iraqi women who underwent to ultrasound examinations in the beginning of pregnancy. Patients and methods: We conducted a cross-sectional study on 84 pregnant women who underwent ultrasound examination in laboratories in different hospitals in Iraq during a period extending from January 14, 2022, to September 24, 2023. This study recorded perinatal outcomes in terms of women's quality of life, complications, morbidity, and fetal mortality. Results: Our study shown that women with (31 - 35) years had the most participants, which include 45; the rate of comorbidities was 30 women, where the most diseases were hypertension with 16 women, diabetes with seven women, previous pregnancy had 45 women, rate of women with one pregnancies had 25, women with two pregnancies was 25 cases, type of pregnancy included singleton had 80 women and twin had 4 cases, smoking status had 13 women, Birth weight (2.26 - 4.06), KG was the most class of women which include 73, morbidity classified into Mild with 9 cases, Moderate with 3 cases, and severe with 2 cases, Fetal death included only one case. Conclusion: Ultrasound is a modern technological advancement that facilitates the making of therapeutic decisions that can save the lives of pregnant women and their babies. It is non-invasive and transmits images through high-frequency sound waves, thereby ensuring the safety of both the patient and the fetus.

Keywords: Ultrasound scan examination, Pregnancy women, Smoking status; and Quality of life.

Introduction

In general, ultrasound is used as an essential test in the prenatal diagnosis and study of pathologies related to women's health [1]. The great information that it provides to professionals in the areas of gynecology and obstetrics has meant a before and after in the early diagnosis of pathologies, both in the future baby and in the woman [2]. 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. [3 – 5]

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, 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. 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. [6 – 9]

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 [10]. 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. 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 [11,12]. The reflective waves are taken by the unit, which throws the final image that can be observed through the monitor [13]. 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 chromosomopathies can be determined [14]. 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 [15].

In the second trimester, obstetric ultrasound is very useful to evaluate the biometrics of the fetus [16]. 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 [17]. Thus being an ideal tool to verify the proper development of pregnancy. Later, with this study it is also possible to analyze in detail the baby's anatomy and its different organs. The obstetric ultrasound of the third trimester seeks to determine the conditions of the placenta and the umbilical cord, in addition to having an approximation to the weight and the position of the baby for the time of delivery. [18]

Patients and methods

Eighty-four pregnant women were invited for inclusion in this study, which used data collected from a different hospital in Iraq during a period ranged from 14 January 2022 to 24 September 2023. Excluded in the study were women having heart failure, osteoporosis, uncertain menstrual history, vaginal bleeding before to 15 weeks in gestation, or uterine size not matching the gestational age according to menstrual dates. These criteria caused the selection of women whose are typically at low risk of having adverse perinatal outcomes.

All women who were 20 years of age or older and who came during a prenatal visit were registered for physicians at the participating practices. The ultrasound screening group was randomly allocated to eligible women who provided informed approval. One ultrasound was performed at 12 weeks in gestation as well as a second at 15 – 20 weeks among the women who participated in the ultrasound screening group.

Regardless of group assignment, the participating physicians' clinical judgment was employed to figure out the course of therapy for the patients, with the exception of organising the two screening sonograms along with conducting required ultrasonography in authorized laboratories. All ultrasound exams were conducted at participating ultrasonography laboratories, regardless of whether they were ordered for screening or clinically necessary. The results were sent to the woman's doctor in the same way as though the doctor had prescribed the examination.

In addition to a stated anatomical survey covering the intracranial anatomy, spine, heart, stomach, cord insertion, diaphragm, kidneys, bladder, or extremities of the fetus, the standardized evaluation of the sonograms included assessments of placental location, amniotic-fluid volume, uterine as well as adnexal pathology, the number of fetuses, as well as sonographic biometry for the fetus (biparietal diameter, head circumference, abdominal circumference, alongside femur length).

Unless the pregnancy resulted in a miscarriage, the ultrasound results, pregnancy results, as well as neonatal outcomes were ascertained by abstracting the prenatal medical records and the inpatient hospital records in antepartum, birth, and neonatal hospital stays for all the women in the study. Every ultrasound that was performed in a laboratory or not was documented as long as the record contained an ultrasound analysis or a mention of the ultrasound's results. Before the baby was released from the hospital, or for up to six weeks after the baby was still there, the neonatal outcomes were noted.

Software titled the Statistical Analysis System is used for organizing and evaluating the data. Fisher's exact test was applied to compare the two groups' dichotomous baseline characteristics, but the chi-square test was used to compare the polychotomous features. The Wilcoxon rank-sum test was carried out to investigate the groups' birth weight distribution and continuous baseline characteristics. The magnitude from the difference between the groups was shown through the point estimate of the relative risk for an adverse perinatal outcome, which is the ratio of the risk of a negative perinatal outcome between the infants in the women who were in the ultrasound-screening group compared with the risk among the infants in the women in the control group, along with the corresponding confidence level of 95 percent intervals. To compare the average number of unfavorable perinatal outcomes between the two groups, Fisher's exact test was used. Every P value that is reported is two-sided. Due to the fact that babies in multiple gestations are not distinct, the relative risk has been adjusted while simultaneously accounting of the type of gestation (single and multiple) if one or more of the studied infants experienced a negative perinatal result.

Results Table 1: Baseline and demographic characteristics of women.

Characteristics	Women [n=84]	Percentage [%]
Age, years		
25 – 30	39	46.43%
31 – 35	45	53.57%
Comorbidities		
Yes	30	35.71%
No	54	64.29%
Hypertension	16	19.05%
Diabetes	7	8.33%
Asthma	4	4.76%
Kidney diseases	2	2.38%
Anemia	3	3.57%
Vital signs		
Cholesterol		
Low	5	5.95%
Moderate	68	80.95%
High	11	13.10%
Heart rate		
Low	2	2.38%
Moderate	78	92.86%
High	4	4.76%
Education status		
High school or less	20	23.81%
College/university	30	35.71%
Post - graduated	34	40.48%
Income, $		
< 400	33	39.29%
400 – 600	30	35.71%
> 600	21	25.00%

Table 2: Diagnoses findings of women through performing ultrasound scan examination

Variables	Number of patients [n = 84]	Percentage [%]
Previous pregnancy		
Yes	45	53.57%
No	39	46.43%
Number of pregnancies		
0	39	46.43%
1	25	29.76%
2	14	16.67%
≥ 3	6	7.14%
Type of pregnancy		
Singleton	80	95.24%
Twin	4	4.76%
Pre-pregnancy weight (kg)		
< 46.8	3	3.57%
46.8 - 80.2	76	90.48%
> 80.2	5	5.95%
Height (cm)		
< 154	2	2.38%
154 - 175.8	78	92.86%
> 175.8	4	4.76%
Smoking status		
Yes	13	15.48%
No	71	84.52%
Induced abortion		
0	66	78.57%
1	14	16.67%
> 1	4	4.76%
Birth weight, KG		
< 2.26	2	2.38%
2.26 - 4.06	73	86.90%
> 4.06	9	10.71%

Table 3: Clinical findings of women who were diagnosed by ultrasound technique.

Items	Number of patients [n = 84]	Percentage [%]
Fetal death		
Yes	1	1.19%
No	83	98.81%
Neonatal death		
Yes	2	2.38%
No	82	97.62%
Morbidity		
None	70	83.33%
Mild	9	10.71%
Moderate	3	3.57%
Severe	2	2.38%
Complications pregnancy		
Yes	15	17.86%
No	69	82.14%

Table 4: Assessment of clinical findings related to quality of life of maternal health.

Items	QoL scale
Physical function	71.16 ± 6.95
Psychological function	68.85 ± 7.20
Social and emotional function	64.46 ± 5.94
Daily activity	70.57 ± 6.28

Table 5: Conduct a univariate analysis of risk factors affecting pregnant women.

Items	OR	CI 95%
Hypertension	3.82	1.52 – 6.89
Diabetes	4.67	1.21 – 6.33
Smoking	3.90	2.48 – 6.61
Pre-pregnancy weight (kg)	6.72	4.16 – 7.96
Birth weight, KG	5.89	2.24 – 7.52
Fetal death	3.47	1.17 – 7.87
Complications pregnancy	4.66	2.65 – 5.39

Discussion

Prior trials of ultrasound screening showed enhanced testing results, which include early diagnosis of more than one gestation as well as identification of errors in the assignment in gestational age, along with varying impacts of an ultrasound screening in interventions such to be induction of labor, as well as the length of the hospital stay [19]. The key question investigated in the research we conducted was whether those diagnostic results and the accompanying therapies led to decreases of perinatal morbidity and death. [20]

Prior evaluations of high-risk trials also failed to discover any discernible variations in the prevalence of unfavorable perinatal outcomes [21 – 23]. If an intervention improved the perinatal outcome in multiple pregnancies during gestation or among small-for-gestational-age children, one would expect a change in the length for gestation along with the distribution of birth weight; however, none was seen [24]. Other randomized studies have not shown superior outcomes from ultrasound screening aimed at detecting intrauterine growth retardation or from therapies in twin pregnancies. [25]

A comprehensive anatomical questionnaire, standardized ultrasound content, as well as quality-assurance procedures were all part of the overall screening technique used in this investigation. In comparison with the total number of women investigated in the three prior failure studies, we studied over two times as many [26]. Our huge sample size allows us to say with 90% confidence that a 15% or 25% increase would have the most effect on the amount of unfavorable perinatal outcomes related to ultrasound screening. The majority of patients were treated by board-certified physicians, had little risk of adverse effects, and got the standard services that pregnant women in the US generally have access to. [27]

Based on a different study, a practice-based trial indicates that ultrasound screening is not improving the perinatal outcome for low-risk pregnant women [28]. Weighing possible benefits, like assuring patients that there really are no fetal abnormalities, against the needless worry associated with the exams, as well as the risks of overtreating as a result of a false positive evaluation, is essential. The implementation of standard ultrasound screening in the US would result in a significant increase in prenatal care costs without an associated increase in perinatal outcomes. [29]

Conclusion

Ultrasound is a very useful Modern technological advance because it allows us to make therapeutic decisions that can save the life of pregnant women and their fetuses. Ultrasound does not emit any type of ionizing radiation; it is a non-invasive method that does not endanger the life of patients or the fetus since the images are transmitted by means of high-frequency sound waves. The ultrasound can be performed as many times as they deem necessary, both the doctor and the patient or the family. It should be borne in mind that no matter how Modern the ultrasound equipment is, the results of this test depend on the doctor who performs the examination. It is important that it is performed by a doctor or Doctor of Medicine, a specialist with high experience in the subject, which allows an adequate diagnosis to be obtained. Ultrasound is a very safe test that allows parents to connect better with their baby and take care of him while protecting the life of the pregnant woman.

References

1. Greenwold N, Wallace S, Prost A, et al. Implementing an obstetric ultrasound training program in rural Africa. Int J Gynaecol Obstet 2014;124 (3):274–7.

2. Kimberly HH, Murray A, Mennicke M, et al. Focused maternal ultrasound by midwives in rural Zambia. Ultrasound Med Biol 2010;36 (8):1267–72.

3. Shah SP, Epino H, Bukhman G, et al. Impact of the introduction of ultrasound services in a limited resource setting: Rural Rwanda 2008. BMC Int Health Hum Rights 2009;9:4.

4. Stein W, Katunda I, Butoto C. A two-level ultrasonographic service in a maternity care unit of a rural district hospital in Tanzania. Trop Doct 2008;38 (2):125–6.

5. Swanson JO, Kawooya MG, Swanson DL, et al. The diagnostic impact of limited screening obstetric ultrasound when performed by midwives in rural Uganda. J Perinatol 2014;34 (7):508–12.

6. McClure EM, Nathan RO, Saleem S, et al. First look: A cluster-randomized trial of ultrasound to improve pregnancy outcomes in low-income country settings. BMC Pregnancy Childbirth 2014;14:73.

7. Nathan R, Swanson JO, Marks W, et al. Screening obstetric ultrasound training for a 5-country cluster randomized controlled trial. Ultrasound Q 2014;30 (4):262–6.

8. Ferraioli G, Meloni MF. Sonographic training program at a district hospital in a developing country: Work in progress. AJR Am J Roentgenol 2007;189 (3): W119–22.

9. Rijken MJ, Lee SJ, Boel ME, et al. Obstetric ultrasound scanning by local health workers in a refugee camp on the Thai-Burmese border. Ultrasound Obstet Gynecol 2009;34 (4):395–403.

10. Rijken MJ, Mulder EJ, Papageorghiou AT, et al. Quality of ultrasound biometry obtained by local health workers in a refugee camp on the Thai-Burmese border. Ultrasound Obstet Gynecol 2012;40 (2):151–7.

11. Wylie BJ, Kalilani-Phiri L, Madanitsa M, et al. Gestational age assessment in malaria pregnancy cohorts: A prospective ultrasound demonstration project in Malawi. Malar J. 2013;12:183.

12. Leatherman S, Ferris TG, Berwick D, et al. The role of quality improvement in strengthening health systems in developing countries. Int J Qual Health Care 2010;22 (4):237–43.

13. Rowe AK, de Savigny D, Lanata CF, et al. How can we achieve and maintain high-quality performance of health workers in low-resource settings? Lancet 2005;366 (9490):1026–35.

14. ACR-ACOG-AIUM-SRU Practice Parameter for the Performance of Obstetrical Ultrasound, 2013.

15. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977;33:159–74.

16. Friedman AM, Srinivas SK, Parry S, et al. Can transabdominal ultrasound be used as a screening test for short cervical length? Am J Obstet Gynecol 2013;208 (3) 190 e1–7.

17. I-TECH. Strengthening Preservice Education: A Vital Effort. Available at: ⟨http://news.go2itech.org/2012/04/strengthening-pre-service/⟩.

18. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. Acad Med 2006;81 (3):207–12.

19. Trinh LT, Michael John D, Byles J: Antenatal care adequacy in three provinces of Vietnam: Long An, Ben Tre y Quang Ngai. Public Health Reports 2006, 121:468–475.

20. Passos AA, Moura ER: Process indicators in the program for humanization of the prenatal care and childbirth in Ceará State, Brazil: analysis of historical series (2001–2006). Cad Saúde Pública 2008, 24:1572–1580.

21. Kyei NN, Chansa C, Gabrysch S: Quality of antenatal care in Zambia: a national assessment. BMC Pregnancy Childbirth 2012, 12:151.

22. Marshall MN, Shekelle PG, McGlynn EA, Campbell S, Brook RH, Roland MO: Can health care quality indicators be transferred between countries? Qual Saf Health Care 2003, 12:8–12.

23. Williams F, Boren SA: The role of the electronic medical record (EMR) in care delivery development in developing countries: a systematic review. Inform Prim Care 2008, 16:139–145. 24. EURO-PERISTAT project with SCPE, EUROCAT, EURONEOSTAT: European perinatal health report. Better statistics for better health in pregnant women and their babies. Paris: EURO-PERISTAT; 2008.

24. Hernández-Herrera RJ, Alcalá-Galván LG, Flores-Santos R: Neural defect prevalence in 248,352 consecutive newborns. Rev Med Inst Mex Seguro Soc 2008, 46:201–204. 28. Scholl TO, Johnson WG: Folic acid: influence on the outcome of pregnancy. Am J Clin Nutr 2000, 71 (5 Suppl): S1295–1303.

25. Simas TA, Liao X, Garrison A, Sullivan GM, Howard AE, Hardy JR: Impact of updated Institute of Medicine guidelines on pre-pregnancy body mass index categorization, gestational weight gain recommendations, and needed counselling. J Women Health (Larchmt) 2011, 20:837–844.

26. McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, Kerr EA: The quality of health care delivered to adults in the United States. N Engl J Med 2003, 348:2635–2645.

27. Menezes EV, Yakoob MY, Soomro T, Haws RA, Darmstadt GL, Bhutta ZA: Reducing stillbirths: prevention and management of medical disorders and infections during pregnancy. BMC Pregnancy Childbirth 2009, 9 (Supply 1): S4.

28. World Health Organization: Department of Making Pregnancy Safer and Department of Reproductive Health and Research: Standards of Maternal and Neonatal Care. Geneva: WHO; 2007.