

## Should Ultrasonography be Done Routinely for all Pregnant Women ?

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### Abstract

**Context:** Although the importance of routine ultrasound screening of the fetus during pregnancy to detect congenital anomalies, multiple-gestation pregnancies, fetal growth disorders and placental abnormalities, and to assess fetal age is not in doubt, but whether or not routine ultrasound screening is desirable is still a contentious issue.

**Objective:** The objective of this study is to determine whether ultrasonography should be done routinely for all pregnant women or not.

**Materials and Methods:** This is a retrospective study that reviewed 1,000 obstetric ultrasound scans performed at the Olabisi Onabanjo University Teaching Hospital, Sagamu between June 1998 and May 1999. The case notes and ultrasound scan records of all the patients were analyzed

**Results:** The age range and the mean age of the 1,000 pregnant women who had the obstetric scans were 17-42 years and  $27.3 \pm 2.1$  years respectively. Six hundred and eight (60.8%) had routine ultrasonography (control group) while 392 (39.2%) were scanned for specific obstetric indications. In all, positive findings were seen in 328 cases (32.8%). Seventy five percent of those with specific indications for scanning had positive findings of clinical significance while only 5.6% of the control group had incidental findings of clinical significance. Positive findings on ultrasound were significantly greater in the group with specific indications for scanning,  $P < 0.001$ .

**Conclusion:** Our suggestion is that ultrasound examination in pregnant women should be performed only when there are clear obstetric reasons, established clinically.

**Key words:** obstetric ultrasound scan, positive findings, pregnancy.

### Introduction

Since the introduction of ultrasonography in obstetrics by Ian Donald, its scope of application has expanded enormously to the extent that the machine has become a standard equipment in many modern obstetric units worldwide. It has drastically curtailed the number of radiological examinations in pregnancy. For example, since the introduction of the first real-time ultrasound in Nigeria, X-ray examinations for placental localization, intrauterine death and fetal maturity have ceased.

There is good reason to suppose that ultrasound scanning is safe for both mother and fetus, which is why routine scanning is recommended by many Governments and the Royal College of Obstetricians and Gynaecologists<sup>1</sup>. The safety of ultrasound has been studied epidemiologically by analyzing the incidence of childhood cancer, dyslexia, speech development and other variables in women exposed to routine antenatal ultrasound examination, compared to those who had an ultrasound examination on indication. These studies have been reassuring and no woman or baby has ever been shown to have been damaged directly by the use of diagnostic ultrasound in pregnancy<sup>2</sup>. Thus far, there is no evidence of any undesirable genetic or other effects of normal diagnostic ultrasonography on the fetus.

However, it is not true to say that ultrasound is a non-invasive method of investigation. Ultrasound can cause bio-effects on cells by inducing heating and cavitation<sup>3</sup>. Chromosomal aberrations have been observed to occur experimentally in animals following exposure to sound frequencies many times higher than those normally

employed in clinical practice. The World Federation of Ultrasound in Medicine and Biology (WFUMB) and the European Federation of Societies of Ultrasound in Medicine and Biology (EFSUMB) have strongly advised that care should be taken during obstetric ultrasound particularly with the Doppler mode<sup>4,5</sup>. The range of ultrasound energy produced by different equipment varies enormously. Some of the newer ultrasound equipment use more focused beams, which result in higher focal intensity than have been hitherto used. Furthermore, the development of spectral Doppler and transvaginal scanning may expose the fetus to higher intensities than those used in the older machines, which were shown to be safe. While there are no restrictions on the use of ultrasound in pregnancy, low energy producing types should be preferable and care should be taken to avoid unnecessary prolonged exposure or the use of ultrasound for frivolous indications. The policy at the antenatal booking clinic of Olabisi Onabanjo University Teaching Hospital, Sagamu is that every pregnant woman should have routine ultrasound done. This study was carried out to determine and compare the frequency of positive findings among two groups of pregnant women: those referred for scanning with specific or obstetric indications and those who were referred for routine obstetric scanning. Thus a more rational policy on ultrasound requests by obstetricians and general practitioners could be advocated from the information

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gathered, taking cost and safety into cognizance.

### Materials and Methods

A Siemens Sonoline SL-1 ultrasound machine fitted with a 5 MHz linear abdominal transducer was used. All of the patients were referred either from the antenatal clinic or the accident and emergency department to the obstetric departmental ultrasound unit of our hospital. Referrals were made by doctors of the obstetrics and gynaecology department, ranging from the level of registrar to the consultant. M-mode and 2-Dimensional obstetric ultrasonography was performed on 1,000 pregnant patients aged 17-42 years. Referrals for obstetric scanning were classified into two groups: those made at the booking antenatal clinic visit as a result of hospital working policy were described as 'routine'- this group served as the control; and the second group consisted of those with specific or obstetric indications for scanning such as dating of pregnancy, clinical disparity between the gestational age by dates and symphysio-fundal height, antepartum haemorrhage and abdominal pain.

The frequency of positive findings with ultrasonography in the two groups were compared taking into cognizance the correlation between pre-scan and post-scan diagnoses. Sensitivity of ultrasonography in each group was obtained by comparing the number of true positives (detected by finding at birth of the babies for example birth weight and also findings at vaginal or abdominal delivery for example placenta praevia) with the total number of positive findings obtained. Observed differences were subjected to statistical analysis using chi-squared tests and p value < 0.05 was taken as significant.

### Results

The age range of the 1,000 pregnant women scanned was 17-42 years while the mean age was  $27.3 \pm 2.1$  years. Six hundred and eight (60.8%) of them had routine ultrasonography while 392(39.2%) were scanned for specific indications (Table 1) In the routine

ultrasonography group, 34 (5.6%) revealed positive findings of clinical significance (Table 2). These findings included multiple (twin) gestation (2), incidental asymptomatic placenta praevia (6), asymptomatic uterine fibroids (2), wrong last menstrual period dates (2), breech presentation (1), ovarian cyst (1), polyhydramnio (1) and fetal congenital abnormalities achondroplasia (1) and hydrocoele (1). There were four false positives and there were no false negatives and therefore gave a method sensitivity of 89.47%. Of those scanned for specific indications, 294 (75%) had positive findings of clinical significance. There were ten false positives while there was one false negative and therefore a method sensitivity of 96.6% in this group. Positive findings were significantly greater in this group than routine ultrasonography group ( $p < 0.001$ ). Positive findings in the group scanned for specific indications included placenta praevia (major and minor) in patients with antepartum haemorrhage; and uterine fibroids and ovarian cysts in the pregnant women with complaints of abdominal pain and palpable abdominal masses. In cases where there was uncertainty as regards the date of last menstrual period, ultrasound examination was used to determine the gestational age. Also in situations where there was clinical disparity between the gestational age by dates and the symphysio-fundal height (SFH) in centimetres, the ultrasound scan was able to detect findings like multiple pregnancy,

Table 1 : Category of women scanned

Category	Sample Number	Percentage
Routine USS	608	60.8
USS for specific indications	392	39.2
Total	1,000	100.0

Table 2 : True positive and false positive findings.

Category	True positive	False negative	Total	True negative	False positive	Sensitivity	Specificity
Routine USS (60.8%)	34(5.6%)	38	70	338	4	89.47%	98.8%
USS for specific indications (39.2%)	294(75%)	304	604	657	8	96.6%	98.8%
Total	328	342	670	657	12	95.41%	99.35%

polyhydramnios and oligohydramnios (Table 3).

**Table 3 : Specific indications for obstetric USS referral.**

Indication	Sample Number	Percentage
L.M.P.unknown	84	21.43
Small for date	138	35.20
Large for date	72	18.37
Antepartum haemorrhage	48	12.25
Reduced/absent fetal movement	28	7.14
Abdominal mass	8	2.04
Abdominal pain	2	0.51
Abnormal lie/presentation	12	3.06
Total	392	100.00

**Discussion.**

Although the importance of routine ultrasound screening of the fetus during pregnancy to detect congenital anomalies, multiple-gestation pregnancies, fetal growth disorders and placental abnormalities, and to assess fetal age is not in doubt<sup>6</sup>, but whether or not routine ultrasound screening is desirable is still a contentious issue. The Royal College of Obstetricians and Gynaecologists in the United Kingdom recommended routine ultrasonography<sup>1</sup> while the National Institute of Health in the United States of America recommended ultrasound scanning on specific indications<sup>7</sup>, where as in France, two scans are recommended<sup>8</sup>. Metaanalysis of some studies comparing random allocation of antenatal patients to routine scanning or scanning on indication showed that in the routine scan group, there was a significant increase in the number of terminations of pregnancy for fetal abnormalities and a significant reduction in the number of undiagnosed twins. Because ultrasound corrected mistakes in gestational age assigned from the last menstrual period, there was also a significant reduction in the number of inductions for post-term pregnancy<sup>9</sup>. However, out of these studies, only the Finnish study addressed the diagnosis of fetal abnormality in detail and found a reduction in the perinatal mortality in the screened group with frequent routine ultrasound because of early diagnosis of malformation and consequent abortion<sup>10</sup>. The two hospitals involved in the trial had different detection rates (77% and 34%). On the contrary, Ewigman et al concluded that routine screening ultrasonography did not improve perinatal outcome as compared with selective use of ultrasound scanning<sup>11</sup>.

In a study carried out by Eik-Nes et al in 2000<sup>12</sup>, there was a reduction in the number of inductions of labour for post-term pregnancies as a result of early dating of pregnancy with ultrasound. It is pertinent to note that ultrasonography is most accurate when used to determine gestational age early in pregnancy within the first 24 weeks<sup>13</sup> unlike X-rays which are used for dating

late in pregnancy. However, a large proportion of pregnant women do not book early in pregnancy in our environment. In this study, 45% of the patients booked for antenatal care after the first 24 weeks gestation. Efetic et al<sup>14</sup> noted a higher proportion (65%). This suggests that more emphasis should be placed on the education of pregnant women on the need for early booking and hence better follow-up and early detection of abnormal conditions.

In order to suggest a more rational policy for this environment, the cost and safety of ultrasound examinations must be considered. Concern about safety has been raised by the attention focused on the bio-effects on cells of the frequent and repeated use of ultrasonography. Mechanistic studies have shown that thermal and cavitation effects can occur on the neonatal brain<sup>15</sup>. Available epidemiological studies show conflicting reports as to the possible effects of in-utero ultrasound exposure on babies. While Campbell et al in Canada<sup>16</sup> found out that ultrasonically-exposed children had a higher probability of exhibiting speech delay and dyslexia, Salvesen et al in Norway<sup>17</sup> demonstrated that ultrasonically-exposed children were less likely to be referred to a speech therapist. Also, a meta-analysis of some epidemiological studies of in-utero ultrasound exposure and subsequent childhood development showed that epidemiological evidence did not indicate any association between diagnostic ultrasound exposure during pregnancy and reduced birthweight, childhood malignancies or neurological mal-development<sup>18</sup>.

The possible association between ultrasound and non-right handedness among boys needs further evaluation<sup>19</sup>.

The results obtained in our study were similar to that of Efetic et al<sup>14</sup> in Abuja, Nigeria. At a glance, our results suggest that selective ultrasonography based on clinical judgement rather than routine screening ultrasonography should be recommended. On subjecting the results to statistical analysis, positive findings were greater in the group with specific indications than the other group with selective ultrasonography. It seems that selective ultrasonography would be more rational for this environment (as observed by Efetic et al<sup>14</sup>) since it is difficult to scientifically justify the use of routine scans in all pregnancies<sup>20</sup>. Apart from the cost-effectiveness, the cost-benefit must also be considered. For example, one ultrasound examination costs five hundred naira or four U.S. dollars in the author's hospital. In an environment where the average monthly income of a sizeable proportion of families is about five thousand naira (US\$40), a routine ultrasonography in every pregnancy would seem inappropriate. We opine that with early booking, detailed history and thorough physical examination, a "clinical baseline" can be established for the index pregnancy while those that

require screening ultrasonography e.g. to confirm multiple pregnancy, to rule out intrauterine growth restriction would be sought out based on clinical judgement from a meticulous follow-up. The suspicion of the above-named diagnoses for example could be aided by palpation of more than two fetal poles/multiple fetal parts or symphysio-fundal height measurement.

In conclusion, we suggest that pregnant women should undergo obstetric ultrasound examination based on clinical indications and not as a matter of routine screening. However, larger studies are still required to sort out this enigma of either routine or selective ultrasonography in pregnancy.

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