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PREGNANCY DATING AND ITS CONFIRMATION IN GHANA: LAST MENSTRUAL PERIOD VERSUS ULTRASONOGRAPHIC DATING.

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ABSTRACT

The accurate determination of the gestational age is important for proper management of the various stages of the pregnancy since improper management could lead to an increase in maternal and infant mortality. Gestational age could be determined through ultrasonography, symphysio-fundal height (SFH) measurement or the use of last menstrual period (LMP) recall. This study aimed to establish the percentage of Ghanaian women who could accurately determine their gestational age using their LMP. A retrospective study was conducted using data extracted from 2089 ultrasound request forms and the corresponding radiological reports of females who presented for antenatal sonographic evaluation in three diagnostic centres in Accra, Ghana, from January 2007 to December 2008. Data collected was analyzed using the statistical package for social scientists version 19. The mean, standard deviation and range for the ages of the participants were 28.8 years ± 5.5, and 12 to 53 years respectively. A total of 1269 (60.8 %) of the study population had their gestational age based on LMP within the acceptable clinical range (± 2 weeks of the earliest accurately determined gestational age). The study showed a significant difference (p-value = 0.001) between the LMP and ultrasound based gestational ages. However no significant difference was seen between age groups and the differences in gestational ages (P = 0.300). The study also indicated that there were more (32.3%) negative clinically unacceptable discrepancies than positive discrepancies (6.9 %). The use of ultrasonography for the confirmation of pregnancy and accurate determination of gestational age in the Ghanaian community is imperative for proper management.

Key words: *Last Menstrual Period, sonographic dating*

INTRODUCTION

The accurate determination of gestational age is very important for proper medical management in the antenatal, delivery and postnatal stages of pregnancy. Information usually obtained from ultrasound assessment of the age of a pregnancy includes the estimated date of delivery (EDD), multiple foetuses or foetal death. Consistent values of gestational age at different times of the pregnancy confirm the proper growth of the foetus. (1), (2) There have been reports of women in labour who have been refused delivery services by front line staff and turned away with the explanation that they were not due for delivery. (3) Inaccuracies in the timing of delivery as a result of wrong due dates gives rise to an increase overall cost of antenatal and delivery services. (4) Wrong due dates are also

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associated with high induction rates with resultant failed inductions, increased caesarean sections and increased perinatal morbidity and mortality. [1] , [5], [6] The degree of discrepancy between the stated gestational age based on the last menstrual period (LMP), and the actual foetal age as determined by ultrasound, is therefore very important for pregnancy management. The discrepancy may be negative; implying that the date by ultrasound is greater than that by LMP. A positive discrepancy then means the LMP based gestational age is greater than the sonographically determined age. The social implications of accurate gestational age determination include the ability to prepare financially for the new addition to the family. Another dimension of wrong due dates brings into focus issues of disputed paternity and its complexities. [7] In Ghana, gestational age is commonly determined by calculation based on the LMP, symphysio-fundal height (SFH) measurements and ultrasonography where available. The accuracy of gestational age figures obtained by LMP calculations are subject to many factors such as, whether the female has a regular 28 day menstrual cycle or whether she has been on hormonal contraceptives. [1] Research however shows that in rural communities, the LMP may provide the best estimate of gestational age where females are assisted by trained field personnel to recall their LMP date. [7]The sensitivity of SFH measurements in the determination of gestational age is low, but may provide a reasonable alternative during the second trimester in areas where sonography is unavailable, and when LMP may be inaccurate, especially where multiple measurements are performed during pregnancy. [8], [9]

Various time-tested and standard sonographic parameters used in gestational age determination include the gestational sac diameter (GSD), the bi-parietal diameter (BPD), femur length (FL) and head circumference (HC). The gestational sac is the first direct evidence of pregnancy and can be seen as early as 4.5 to 5 weeks of pregnancy during transabdominal scanning. [10] Transvaginal sonography may however reveal the presence of a gestation at 4 weeks. [11] Images of the embryo or foetus can be obtained as early as 6 weeks of pregnancy. The Crown Rump Length (CRL) can accurately be measured after 6 to 9 weeks, whilst the BPD is most reliable from 12 to 26 weeks. After 26 weeks, the accuracy of BPD measurements decreases and FL remains as the most reliable measure in the third trimester. [10], [11], [12] The accuracy of sonography as a tool for dating a pregnancy diminishes with increasing gestation and is most accurate in the first trimester. The CRL gives an estimation of the date by ± 3 days at 7-10 weeks and ± 5 days at 10-14 weeks gestation, the BPD and femur length by ± 1 week in early second trimester, ± 2 weeks at late second trimester and ± 3 weeks during the third trimester. [13] This study aimed to establish the percentage of Ghanaian women who could accurately determine their gestational age using their LMP.

METHOD

A retrospective study was conducted using data extracted from 2089 ultrasound request forms and the corresponding radiological reports of females who presented for antenatal sonographic evaluation on suspicion of pregnancy in three diagnostic centres in Accra, Ghana, from January 2007 to December 2008. All the sonographic evaluations were

conducted by consultant radiologists using a Medison MySono201 ultrasound machine, with a 2 to 5MHz broadband multi-frequency convex probe. At least two gestational age parameters were obtained for each patient, except for pregnancies aged between 6 and 12 weeks, when only the CRL was measured. The BPD and FL were measured from 12 weeks onward. Where the shape of the head was abnormal (dolicocephaly and brachycephaly), the HC was substituted for BPD. The gestational age of each pregnancy was then automatically obtained by the ultrasound machine using Hadlock reference tables. All females included in the study had been asked to give the estimated age of their pregnancy based on the time lapse between the day of questioning and their last menstrual period. Only adequately completed request forms of females seeking antenatal sonography were included in the study. The information reviewed included patient age, the age of the pregnancy as per LMP, trimester of the pregnancy, clinical history and sonographic findings. The data collected was coded and entered into a database using the Microsoft Access data base. Data analysis was then carried out using the statistical package for social scientists version 19.

RESULTS

The age range for the females whose data was analyzed was 12 to 53 years, with mean and standard deviation values of 28.8 years and 5.5, respectively. Two thousand and seventy three (2073) had their pregnancies confirmed by ultrasongraphy, whilst 16 people had no sonographic evidence of pregnancy. The modal age group was 20-29 years as indicated in figure 1.

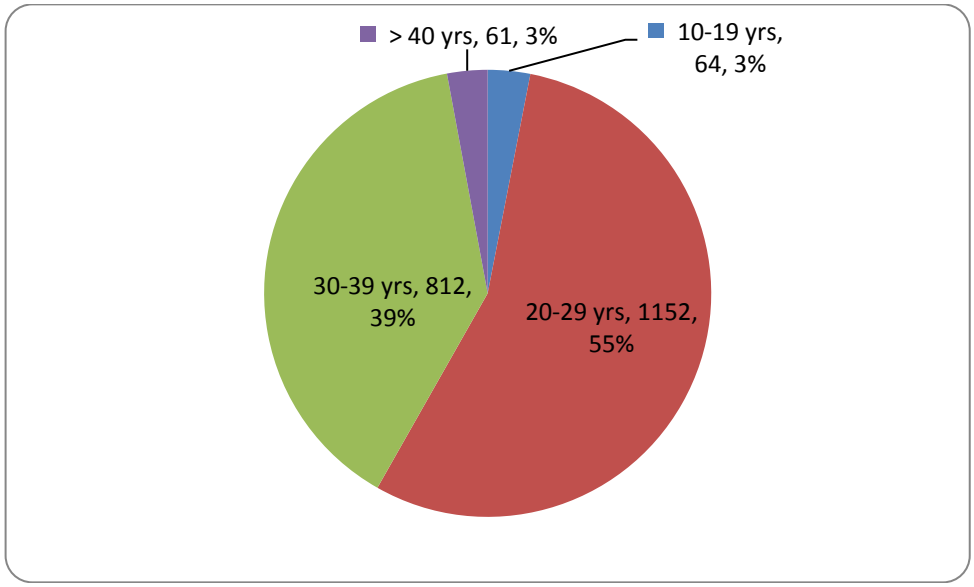

Figure 1: Age group distribution of study participants

Of the 2089 females examined, 305 (14.6 %) had their estimated gestational ages based on LMP being exactly as that determined by ultrasound. Nine hundred and sixty-four (46.2 %) had their estimated gestational ages based on LMP differing from that recorded by

ultrasound by two weeks. Therefore, a total of 1269 (60.8 %) of the study population had their gestational age based on LMP within the acceptable clinical range (± 2 weeks of the earliest accurately determined gestational age). The study also indicated that 145 (6.9%) females had positive discrepancies of more than 3 weeks, whilst 675 (32.3%) had negative discrepancies of more than 3 weeks. For all age groups, more females stated gestational ages within the clinical acceptable range. The highest percentage of 65.6% occurred in the greater than 39 years age group, whilst the lowest of 60.4% occurred in the 30-39 years age group. Table 1 illustrates the age group distribution against the degree of discrepancy.

Table1: Age group versus degree of discrepancy.

	Degree of discrepancy				Total
	Acceptable Clinical Range		Unacceptable Clinical Range		
Age Groups (years)	No deviation N (%)	± 2 Weeks N (%)	<-2 Weeks N (%)	> +2 Weeks N (%)	N (%)
10-19	12 (18.8)	27 (42.2)	19 (29.7)	6 (9.4)	64 (100.0)
20-29	160 (13.9)	537 (46.8)	381 (33.2)	70 (6.1)	1148 (100.0)
30-39	125 (15.3)	368 (45.1)	259 (31.7)	64 (7.8)	816 (100.0)
> 39	8 (13.1)	32 (52.5)	16 (26.2)	5 (8.2)	61 (100.0)
Total	305 (14.6)	964 (46.1)	675 (32.3)	145 (6.9)	2089 (100)

The relationship between the degree of discrepancy and the trimester of the pregnancy is presented in Table 2. The study shows that first trimester estimations were the most accurate with 18.6 % having no deviation, and 67.8 % having gestational ages within the acceptable clinical range. The second trimester had the least accurate determinations of 57.2% within the acceptable clinical range.

Table 2: Accuracy of gestational age discrepancy by trimester

	Degree of Discrepancy				
	Acceptable Clinical Range		Unacceptable clinical range		
Trimester	No deviation N (%)	± 2 Weeks N (%)	<-2 Weeks N (%)	> +2 Weeks N (%)	Total N (%)
1st		328(49.2)	73(10.9)	142(21.3)	667(100.0)

	124(18.6)				
2nd	92(11.5)	365(45.7)	42(5.3)	300(37.5)	799 (100.0)
3rd	89 (14.7)	271(44.7)	14(2.3)	232(38.3)	606 (100.0)
Total	305	964	129	674	2072

Table 3 shows the distribution of females [N (%)] in the different age groups and the trimesters of pregnancy. Within the various age groups, slightly more females opted for sonography in their second trimester of pregnancy except those aged more than 39 years who sought sonographic evaluation in their third trimester.

Table 3: Trimester of pregnancy against age groupings

Age Group (yrs)	Trimester of pregnancy First Trimester	Second Trimester	Third Trimester	Total
10-19	7 (11.1)	29 (46.0)	27 (42.9)	63 (100)
20-29	395 (34.6)	438 (38.4)	309 (27.1)	1142 (100)
30-39	248 (30.7)	313 (38.7)	247 (30.6)	808 (100)
> 39	17 (28.3)	19 (31.7)	24 (40.0)	60 (100)
Total	667 (32.2)	799 (38.5)	607 (29.3)	2073 (100)

The degree of discrepancy against the sonographic findings is presented in Table 4.The study indicates that thousand five hundred and sixty three (74.8%) of the total participants (2089) had normal antenatal scan findings. Within this group, 61.1% of them reported gestational period within the acceptable clinical range. The study also indicated that 58.7% of the participants with foetal demise and bleeding in pregnancy scans presented gestational period within the unacceptable range. Seven females were found not to be pregnant and therefore had a 100% unacceptable positive discrepancy.

Table 4: Sonographic Findings versus Degree of Discrepancy

	Degree of discrepancy				
	Acceptable Clinical Range		Unacceptable Clinical Range		
Sonographic Findings	No deviation	± 2 Weeks	<-2 Weeks	> +2 Weeks	Total
	N (%)	N (%)	N (%)	N (%)	N (%)

Normal pelvic scan	0	0	0	7 (100.0)	7 (100.0)
Normal Antenatal scan	235 (15.0)	721(46.1)	530 (33.9)	77 (4.9)	1563 (100.0)
Praevia, Abnormal lie, hydrocephalus, etc.	22 (10.3)	99 (46.3)	83 (38.8)	10 (4.7)	214 (100.0)
Twins	6 (15.4)	16 (41.0)	16 (41.0)	1 (2.6)	39 (100.0)
Fatal demise and bleeding in pregnancy	8 (10.0)	25 (31.4)	10 (12.5)	37 (46.2)	80 (100.0)
Fibroid	22 (20.4)	54 (50.0)	25 (23.1)	7 (6.5)	108 (100.0)
Ovarian cyst	7 (11.1)	43 (68.3)	7 (11.1)	6 (9.5)	63 (100.0)
Polyhydramnios	0	0	2 (100)	0	2 (100.0)
Oligohydramnios	5 (38.5)	6 (46.2)	2 (15.4)	0	13 (100.0)
Total	305	964	675	145	2089

Table 5 demonstrates the relationship between the age group, degree of discrepancy and trimester of pregnancy. The first trimester had most females in all age groups stating their gestational age within acceptable clinical range, with percentages ranging from 85.7% for the age group 10-19 years to 66.2% in the age group 30-39 years. For participants in their second trimester of pregnancy, 84.2 % of those above 39 years and 55.7% of those in the age group 20 to 29 years reported gestational period within the clinically acceptable range. The third trimester however, depicted mixed results. Equal numbers of acceptable and unacceptable discrepancies were identified among the 40 years and above age group

Table 5: Trimester of pregnancy, age group and degree of in cross tabulation

		Degree of discrepancy				
		Acceptable Clinical Range		Unacceptable Clinical Range		Total
		No deviation	± 2 Weeks	<-2 Weeks	> +2 Weeks	
Trimester	Age Group	N (%)	N (%)	N (%)	N (%)	N (%)
First	10-19 years	2 (28.6)	4 (57.1)	1 (14.3)	0 (0.0)	7 (100.0)
	20-29 years	65 (16.5)	205 (51.9)	92 (23.3)	33 (8.4)	395 (100.0)

	30-39 years	53 (21.4)	111 (44.8)	46 (18.5)	38 (15.3)	248 (100.0)
	> 40 years	4 (23.5)	8 (47.1)	3 (17.6)	2 (11.8)	17 (100.0)
	Total	124 (18.6)	328 (49.2)	142 (21.3)	73 (10.9)	667 (100.0)
Second	10-19 years	7 (24.1)	14 (48.3)	5 (17.2)	3 (10.3)	29 (100.0)
	20-29 years	50 (11.4)	194 (44.3)	169 (38.6)	25 (5.7)	438 (100.0)
	30-39 years	32 (10.2)	144 (46.0)	125 (39.9)	12 (3.8)	313 (100.0)
	> 40 years	3 (15.8)	13 (68.4)	1 (5.3)	2 (10.5)	19 (100.0)
	Total	92 (11.5)	365 (45.7)	300 (37.5)	42 (5.3)	799 (100.0)
Third	10-19 years	3 (11.1)	9 (33.3)	13 (48.1)	2 (7.4)	27 (100.0)
	20-29 years	45 (14.6)	138 (44.7)	120 (38.8)	6 (1.9)	309 (100.0)
	30-39 years	40 (16.2)	113 (45.7)	88 (35.6)	6 (2.4)	247 (100.0)
	> 40 years	1 (4.2)	11 (45.8)	12 (50)	0 (0.0)	24 (100.0)
	Total	89 (14.70)	271 (44.60)	233 (38.40)	14 (2.30)	607 (100.0)

Non-parametric test (Wilcoxon test) for two related-sample showed a significant difference (p = 0.001) between the LMP and sonographically determined gestational ages as shown in Table 6.

		Descriptive Statistics					
Variables	N	Mean	Std. Deviation	Minimum	Maximum	z-value	P-value
LMP Age	2089	18.99	9.922	0	40	-22.052	0.001
Sonographic Age	2089	20.36	10.344	0	42		

Analysis of Variance (ANOVA) of trimester against differences in LMP and ultrasound based gestational ages showed statistically significance (p= 0.001). Further analysis using post-hoc (Bonferroni) revealed significant differences between first and second trimesters, first and third trimester , first trimester and no pregnancy, the second trimester and no pregnancy as well as third and no pregnancy, all registering p-value of 0.001(Table 7). However similar analysis showed no significant difference between age group and the differences in gestational periods (P=0.300)

Table 7: Post hoc test (Bonferroni) of the trimester of pregnancies and differences in gestational age (between LMP and Sonographic age)

Trimester of pregnancy	Trimester of pregnancy	Mean Difference	Std. Error	P-value	95% Confidence Interval	
					Lower Bound	Upper Bound
First Trimester	Second Trimester	1.169*	0.15	0.001	0.77	1.56
	Third Trimester	1.493*	0.16	0.001	1.07	1.92
	No Pregnancy	-13.341*	0.721	0.001	-15.25	-11.44
Second Trimester	First Trimester	-1.169*	0.15	0.001	-1.56	-0.77
	Third Trimester	0.324	0.153	0.208	-0.08	0.73
	No Pregnancy	-14.510*	0.72	0.001	-16.41	-12.61
Third Trimester	First Trimester	-1.493*	0.16	0.001	-1.92	-1.07
	Second Trimester	-0.324	0.153	0.208	-0.73	0.08
	No Pregnancy	-14.834*	0.722	0.001	-16.74	-12.93
No Pregnancy	First Trimester	13.341*	0.721	0.001	11.44	15.25
	Second Trimester	14.510*	0.72	0.001	12.61	16.41
	Third Trimester	14.834*	0.722	0.001	12.93	16.74

DISCUSSION

In gestational age assessments, discrepancies of ± 2 weeks from the first accurately determined gestational age are usually acceptable in clinical obstetric practice. [(14)] A total of 1269 (60.8%) of the study population had LMP based gestational age values within an acceptable range from the sonographic determined age. Of these, 305 (14.6%) had no discrepancies between the LMP based and sonographically determined gestational ages. The study also indicated that 145 (6.9) % of the participants had positive discrepancies (that is the gestational age by LMP was greater than that by ultrasound of at least 2 weeks and in one case, by as much as 16 weeks). These overestimations are likely to result in an abnormally high number of presumed postdate deliveries in areas where no ultrasound facilities are available and females rely solely on LMP and Symphysio-fundal height

measurements [5], even though in actual fact these may be preterm deliveries. The consequence will therefore be greater numbers of failed inductions and increased emergency caesarean section rates. [15] Real postdate deliveries are associated with an increased incidence of postpartum haemorrhage, severe perineal injury, an increased incidence of puerperal infections and hospital cost which fortunately, females concern will not have to contend with. The effect on the baby may be an increased occurrence of macrosomia, meconium aspiration, intrapartum asphyxia, low 5-minute APGAR scores, still birth or neonatal death. Positive discrepancies may however indicate the possibility of growth restriction. [2]

Six hundred and seventy-five females (32.3%) had negative discrepancies of at least 3 weeks. These negative discrepancies result in erroneously high number of presumed preterm deliveries, though in fact these may be term deliveries [1]. Higher occurrences of negative discrepancies increase the chances of a woman getting into labour when she is not prepared. This poses significant risks to both mother and baby. This finding of this current study contrasts some previous studies [5], [14] which showed that gestational age estimations by LMP yielded more post-term deliveries, but is consistent with a study by Yang H et al (2002). [6] The study also indicated that majority, 1148 (54.9%) of females were aged between 20 and 29 years followed by those in the 30-39 years age group [816 (39.1%)].The findings are consistent because the reproductive age of typical Ghanaian women is between the ages of 20 to 40 years. [16] Sixty-one females (2.9%) were aged 40 years or older whilst, 64 (3.1%) were teenagers. The small number of teenagers may be due to the reluctance of teenagers to attend clinics because of financial constraint, fear of being ridiculed and also being reprimanded by the older patients. Low attendance at antenatal care services as corroborated by this study has no doubt been identified as a significant contributor to the adverse pregnancy outcome associated with teenage pregnancy. [17] To improve maternal and foetal outcome among the teenage populace, there is the need for policies and strategies in the Ghanaian health sector that will offset this challenge of low attendance by the teenage pregnant population. This will help the country to achieve the targets set out in the Millennium Development Goals 4 and 5. [18] The study showed a significant difference ($p = 0.001$) between the LMP determined age and sonographic age. This variation is partly attributed to the large illiteracy rate among the Ghanaian populace. [16] For example, some of the participants stated that they had no idea on how to calculate the gestational age based on their LMP. The lack of knowledge of accurate gestational age determination in societies where sonography is not available is of great significance, as simple education of all young females either at home or in schools will help to eliminate this factor. [19], [20] No significant difference among the age groups ($p = 0.944$) was observed in the ability of the females to accurately estimate gestational age. The ability of all age groups to state acceptable gestational ages ranged between 60.4% for the 30-39 years age group, to 65.6% for the above 39 years age group. The 10-29 years and 20-29 years age groups had 61% and 60.7% respectively. The trend of unacceptable discrepancies greater than two weeks was also similar for all age groups. The age of females therefore does not appear to significantly influence their ability to accurately determine the gestational age using their LMP. There

were insignificant differences (p-value=0.288) in discrepancies in relation to the various trimesters. About 67.8% of females who were questioned in the first trimester accurately estimated their gestational age within acceptable limits as compared to 57.2% and 59.4% in the second and third trimesters respectively. This variation may be as a result of the higher recall rate in the first trimester due the shorter interval between the LMP and the visit to the medical imaging facility. This finding lends support to the need for early antenatal attendance and ultrasound request. The higher percentage in the third trimester than the second can be explained by the fact that most females in this category have usually had at least one previous sonogram, and hence simply add the appropriate weeks to the previous sonographically determined age. Those reporting during the second trimester may be availing themselves for their first scan, several weeks after their last LMP, probably due to the lack of funds. The LMP recall rate of such females is thus likely to be lower than females reporting in the first trimester, due to the longer interval of time between the first day of the period and the day of scanning.

Most teenagers sought sonographic evaluation in the second trimester (46.0%), followed by the third trimester (36.9%). This trend appears useful to antenatal care in this vulnerable group, since the second trimester is the time when all age groups are generally noted to exhibit the least ability to accurately determine their gestational age based on LMP recall. Table 5 however depicts that the 10-19 years age group had the most acceptable estimations in the 1st trimester, followed by the 2nd and had the least acceptable estimations in the 3rd trimester. For this group, which is usually cash-strapped and may probably only be able to afford one scan in the course of the pregnancy, the second trimester, especially between 18 to 20 weeks gestation seems the appropriate time for their one-off antenatal ultrasound evaluation. [(1), (21)] Coincidentally, this is the period when a detailed foetal anatomical survey can be done making it cost effective. All the other age groups accept the greater than 39 years age group also had their highest visitations to the ultrasound centre in their second trimester. The majority of females aged 40 years and above, had their sonograms in the third trimester. Since foetal anomalies especially neural tube defects are commoner in this age group, the opportunity of early diagnosis in the first and second trimesters would have been missed. Considering the sonographic findings observed in the study, three times as many females with normal antenatal scans (956) as those with significant sonographic findings (313) had no discrepancies or had acceptable discrepancies. Of the 313 females with significant findings, 121 had miscellaneous findings not considered relevant to the accurate determination of gestational age using the LMP such as, placenta praevia and hydrocephalus, 76 had fibroids, 50 had ovarian cysts, and 33 and 22 females had reports of early antenatal bleeding and twin pregnancy respectively. Eleven females had oligohydramnios, and 2 had polyhydramnios. All the sonographic findings showed more females had acceptable LMP-gestational age determinations, except in females with early antenatal bleeding where, 58.7% had unacceptable gestational discrepancies, as compared to 41.2% who had acceptable discrepancies. Regarding the unacceptable discrepancies, there were more females with unacceptable negative discrepancies except, in females with a history of antenatal bleeding. This is likely to result in more presumed preterm than post term

deliveries as stated by Kallen (2002).[22] Considering the 58.7% of females with early antenatal bleeding, 46.2% had positive discrepancies. This was due to a large number of miscarriages within this subset of sonographic outcomes, probably occurring after an initial period of normal pregnancy. The negative discrepancies observed in fewer cases of early antenatal bleeding, may be due to difficulty in determining the first day of the LMP. Sonography revealed that 23 females had no evidence of pregnancy despite their strong convictions of having been pregnant for periods ranging from 4 to 32 weeks. Five females believed they were 16 weeks pregnant, whilst 1 person each thought they were 20 and 32 weeks pregnant. It is therefore important to encourage early sonographic estimation of gestational age so that scarce hospital resources will not be wasted on those who are not pregnant, in the light of free maternal services as pertains in Ghana. The study also revealed that discrepancies varied within the various age groups depending on the trimester. Whilst the above 39 years age group had more acceptable discrepancies in the 1st and 2nd trimesters, they had equal numbers of acceptable and unacceptable discrepancies in the 3rd trimester. The 10-19 year age group had more acceptable discrepancies in the 1st and 2nd trimesters, but showed a reversal in the 3rd trimester. The 20-39 years age group showed no effect of trimester on the degree of discrepancy, and had more acceptable than unacceptable discrepancies, regardless of the trimester. Teenagers attending antenatal care for the first time in the third trimester of their pregnancy therefore, must be made to obtain an ultrasound scan for accurate dating as part of their management.

CONCLUSION

This study assessed the ability of some females in Ghana to accurately determine their gestational age based on their LMP. It showed that there were more negative discrepancies than positive discrepancies, 32.3% and 6.9% respectively. The age of females did not significantly influence their ability to accurately determine the gestational age. Gestational age determination by the women was generally more accurate in the first trimester. With the exception of cases of bleeding in pregnancy, all other groups of sonographic outcomes showed either more acceptable gestational age estimations, or more negative discrepancies. Females with antenatal bleeding due to a miscarriage had more unacceptable gestational age determinations, or more positive discrepancies. Despite the small number of cases of pseudocyesis (23 patients), the study has shown that the use of ultrasonography for the confirmation of pregnancy and accurate determination of gestational age in the Ghanaian community is imperative for proper management.

REFERENCES

Hunter LA. Issues in Pregnancy Dating: Revisiting the Evidence: Menstrual Dating. J Midwifery Women's Health. 2009; 54 (3): 184 – 190

Morin I, Morin L, Zhang X, Plaat RW, Blondel B, Bréart G, et al. Determinants and consequences of discrepancies in menstrual and ultrasonographic gestational age estimates. BJOG. 2005 Feb; 112 (2):145-52.

A Communique on the Adoption of Partograph with a latent Phase. Published on 18 October 2012 by AWDF in News/ press. (accessed 24/11/2012)

Banta D. What is the efficacy/effectiveness of antenatal care and the financial and organizational implications? Copenhagen, WHO Regional Office for Europe (Health Evidence Network report. 2003; www.euro.int/Document/E82990.pdf (accessed 16/12/2012)

Savitz DA, Terry JW Jr, Dole N, Thorp JM Jr, Siega-Riz AM, Herring AH. Comparison of pregnancy dating by last menstrual period, ultrasound scanning, and their combination. AM J Obstet Gynecol. 2002 Dec; 187 (6): 1660-6. (accessed 22/5/2011) .

Yang H, Kramer MS, Platt RW, Blondel B, Bréart G, Morin I, et al. How does early ultrasound scan estimation of gestational age lead to higher rates of preterm birth? Am J Obstet Gynecol. 2002 Mar; 186 (3): 433-7

Lyn Turney (2005). Paternity Secrets: Why Women Don't tell. Journal of Family Studies: vol. II, No 2, pp 227-248. (accessed 16/12/2012).

White L J, Lee SJ, Stepniewska K, Simpson JA, Dwell, SLM, Arunjerdja R, et al. Estimation of gestational age from fundal height: a solution for resource-poor settings. (Journal of the Royal Society Interface). J R Soc Interface. 2012 March 7; 9(68): 503-510. Published on line 2011 August 17. Doi: 10.1098/rsif.2011.0376 (accessed 24/11/2012)

Neufeld L M, Haas JD, Grajéda R, Martorell R. Last menstrual period provides the best estimate of gestational length for women in rural Guatemala. Paediatrics and Perinatal Epidemiology. 2006 Jul; 20 (4), 290-298

Breyer B, Bruguera CA, Gharbi HA, Golberg BB, Tan FEH, Wachira MW, Weil FS. Obstetrics Scanning. In: Palmer PES, Editor. Manual of Diagnostic Ultrasound. France: World Health Organization; 1995.

Principles of Obstetrics and Gynaecology 2003 course manual. The Thomas Jefferson Ultrasound Research and Education Institute.

Chisholm R, Jenkins JPR. Obstetric Ultrasound. In: Sutton D, Allan PL, Editors. A Textbook of Radiology and Imaging. 7TH Edition. New York:Churchill Livingstone, 2003: 1039 - 45

Benson C B, Doubilet PM : Sonographic Prediction Of Gestational Age; Accuracy of Second and third trimester foetal measurements. AJR Am J Roentgenol 157:1275, 1991.

Rosenberg RE, Ahmed ASMNU, Ahmed S, Saha SK, Chowdhury MAKA, Black RE, et al. Determining gestational age in a low-resource setting: Validity of Last Menstrual Period. Journal of Health, Population and Nutrition (J Health Nutr. 2009 June; 27(3: 332-338). Accessed 24/11/2012(accessed 24/11/2012)

Roberts C L, Tracy S, Peat B. Rates for obstetric intervention among private and public patients in Australia: population based descriptive study. "British Medical Journal", v321:140 July 2000.

Ghana Statistical Services (GSS), Noguchi Memorial Institute for Medical Research (NMIMR), and ORC Macro. Ghana demographic and health survey 2003. Calverton, Maryland: GSS, NMIMR and ORC Macro; 2004. p.11. Accessed from: http://www.measuredhs.com. Available by email from: reports@orcmacro.com

Gordon C.S Smith, Jill P Pell. Teenage pregnancy and risk of adverse perinatal outcome associated with first and second births: Population based retrospective cohort study. BMJ 2001, Sept 323(7311): 476.

MillenniumDevelopmentGoalshttp://www.undp.org/content/undp/en/home/mdgoverview/mdg_goals/mdg5/ (accessed 2/12/2012)

Andersen H F, Johnson TR, Jr., Barclay ML, Flora JD., Jr Gestational age assessment. I. Analysis of individual clinical observations. Am J Obstet Gynecol. 1981;139:173–7. [PubMed] (accessed 24/11/2012)

Andersen H F, Johnson TR, Jr., Flora JD, Jr., Barclay ML. Gestational age assessment. II. Prediction from combined clinical observations. Am J Obstet Gynecol. 1981;140:770–4. [PubMed]) (accessed 24/11/2012)

Taipale P, Hiilesmaa V. Predicting delivery date by ultrasound and last menstrual period in early gestation. Obstet Gynecol. 2001; 97(2): 189-94

Källén K. Mid-trimester ultrasound prediction of gestational age: advantages and systematic errors. Ultrasound Obstet Gynecol. 2002 Dec; 20 (6): 558-63.