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Rate of Re-dating after Determination of Gestational Age using Ultrasonography in Clinically Reliable and Clinically Non-reliable Pregnant Women during the First Trimester

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ABSTRACT

Objectives: The primary outcome was to compare the rate of gestational age (GA) re-dating after determination of GA using ultrasonography (US) in clinically reliable (non-indicated US) and clinically non-reliable (indicated US) pregnant women during the first trimester. The secondary objective was to present the incidence of accidentally diagnosed abnormal pregnancy and identify the clinical factors influencing the need for GA re-dating.

Materials and Methods: This is an analytic cross-sectional study comparing the rate of GA re-dating after determination of GA using US in clinically reliable and clinically non-reliable pregnant women, as well as presenting the incidence of GA re-dating among pregnant women overall and incidence of accidentally diagnosed abnormal pregnancy, comparing the discrepancy in duration of pregnancy between clinically reliable and clinically non-reliable groups.

Results: A total of 119 participants were enrolled. After US, 11 (11/119, 9.24%) participants received an abnormal or complicated pregnancy diagnosis. The rate of participants who needed GA re-dating and had an abnormal pregnancy diagnosis in the clinically non-reliable and clinically reliable groups were similar. 23 in 51 (45.1%) participants in clinically non-reliable were needed GA re-dating and 25 in 57 (52.1%) participants in clinically reliable were needed GA re-dating, ($p = 0.995$). If GA re-dating was needed, there was no statistically significant difference in the median number of days of GA re-dating between the clinically non-reliable and clinically reliable groups [10 (interquartile range (IQR) 07.00-21.00) vs 12 (IQR 8.00-15.00) days, $p = 0.872$).

Conclusion: Nearly half of the pregnant women needed GA re-dating when undergoing US in the first trimester of pregnancy. The rate of GA re-dating was similar in the clinically reliable and clinically non-reliable groups without any hint of clinical factor influence. Approximately 10% of participants found an abnormal pregnancy diagnosis. Eight percent found abnormal pregnancy in clinically reliable groups.

Keywords: gestational age, corrected, ultrasonographic, indicated, non-indicated

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สัดส่วนการปรับอายุครรภ์ใหม่หลังการประเมินอายุครรภ์โดยการตรวจคลื่นเสียงความถี่สูงในหญิงตั้งครรภ์ที่ข้อมูลทางคลินิกเชื่อถือได้ กับไม่ได้ช่วงไตรมาสแรกของการตั้งครรภ์

สุพพดา ฉัตรตระกูลพงษ์, กิตติพงษ์ คงสมบูรณ์, ธารางรัตน์ หาญประเสริฐพงษ์

บทคัดย่อ

วัตถุประสงค์: *วัตถุประสงค์หลักเพื่อเปรียบเทียบสัดส่วนของหญิงตั้งครรภ์ไตรมาสแรกที่ปรับอายุครรภ์ใหม่หลังตรวจประเมินอายุครรภ์ด้วยคลื่นเสียงความถี่สูงระหว่างหญิงตั้งครรภ์ที่ข้อมูลทางคลินิกเชื่อถือได้ (ไม่มีข้อบ่งชี้) กับอาการทางคลินิกเชื่อถือไม่ได้ในการประเมินอายุครรภ์ (มีข้อบ่งชี้) วัตถุประสงค์รองเพื่อแสดงอุบัติการณ์การตั้งครรภ์ผิดปกติโดยบังเอิญ และแสดงปัจจัยทางคลินิกที่มีผลต่อการปรับอายุครรภ์ใหม่หลังตรวจประเมินอายุครรภ์ด้วยคลื่นเสียงความถี่สูง*

วัสดุและวิธีการ: *การศึกษาแบบวิเคราะห์ตัดขวางเปรียบเทียบสัดส่วนของหญิงตั้งครรภ์ไตรมาสแรกที่ปรับอายุครรภ์ใหม่หลังตรวจประเมินอายุครรภ์ด้วยคลื่นเสียงความถี่สูงระหว่างหญิงตั้งครรภ์ที่ข้อมูลทางคลินิกเชื่อถือได้ (ไม่มีข้อบ่งชี้) กับอาการทางคลินิกเชื่อถือไม่ได้ในการประเมินอายุครรภ์ (มีข้อบ่งชี้) แสดงอุบัติการณ์การปรับอายุครรภ์ใหม่และการพบการตั้งครรภ์ผิดปกติโดยบังเอิญของหญิงตั้งครรภ์ทั้งหมด และเปรียบเทียบความคลาดเคลื่อนในระยะเวลาตั้งครรภ์ระหว่างกลุ่มที่ข้อมูลทางคลินิกเชื่อถือได้กับอาการทางคลินิกเชื่อถือไม่ได้ในการประเมินอายุครรภ์ และยังระบุปัจจัยทางคลินิกที่มีอิทธิพลต่อความจำเป็นในการปรับอายุครรภ์*

ผลการศึกษา: *มีหญิงตั้งครรภ์เข้าร่วมการศึกษา 119 คน หลังตรวจคลื่นเสียงความถี่สูงหญิงตั้งครรภ์ 11 ใน 119 (ร้อยละ 9.24) ตรวจพบการตั้งครรภ์ผิดปกติ สัดส่วนของหญิงตั้งครรภ์ไตรมาสแรกที่ปรับอายุครรภ์ใหม่หลังตรวจประเมินอายุครรภ์ด้วยคลื่นเสียงความถี่สูงและอุบัติการณ์การพบการตั้งครรภ์ผิดปกติระหว่างหญิงตั้งครรภ์ที่ข้อมูลทางคลินิกเชื่อถือได้ (ไม่มีข้อบ่งชี้) กับอาการทางคลินิกเชื่อถือไม่ได้ในการประเมินอายุครรภ์ (มีข้อบ่งชี้) ไม่มีความแตกต่างกัน 23 ใน 51 (ร้อยละ 45.1) และ 25 ใน 57 (ร้อยละ 52.1) หญิงตั้งครรภ์ ที่ข้อมูลทางคลินิกเชื่อถือไม่ได้ (มีข้อบ่งชี้) กับอาการทางคลินิกเชื่อถือได้ในการประเมินอายุครรภ์ (ไม่มีข้อบ่งชี้) มีการปรับอายุครรภ์ใหม่หลังตรวจประเมินอายุครรภ์ด้วยคลื่นเสียงความถี่สูง ($p = 0.995$). พิจารณาเฉพาะกลุ่มที่ต้องปรับอายุครรภ์ใหม่ ค่ากลางจำนวนวันที่ต้องมีการปรับระหว่างหญิงตั้งครรภ์ที่ข้อมูลทาง*

คลินิกเชื่อถือได้ (ไม่มีข้อบ่งชี้) กับอาการทางคลินิกเชื่อถือไม่ได้ในการประเมินอายุครรภ์ (มีข้อบ่งชี้) ไม่มีความแตกต่างกัน

***สรุป**: สัดส่วนของหญิงตั้งครรภ์ไตรมาสแรกที่ปรับอายุครรภ์ใหม่หลังตรวจประเมินอายุครรภ์ด้วยคลื่นเสียงความถี่สูงระหว่างหญิงตั้งครรภ์ที่ข้อมูลทางคลินิกเชื่อถือได้ (ไม่มีข้อบ่งชี้) กับอาการทางคลินิกเชื่อถือไม่ได้ในการประเมินอายุครรภ์ (มีข้อบ่งชี้) ไม่มีความแตกต่างกัน เกือบครึ่งของหญิงตั้งครรภ์จำเป็นต้องปรับอายุครรภ์ใหม่เมื่อตรวจคลื่นเสียงความถี่สูงช่วงไตรมาสที่ 1 โดยไม่มีข้อมูลทางคลินิกใดชี้นำ ประมาณร้อยละ 10 ของหญิงตั้งครรภ์ในการศึกษานี้ตรวจพบการตั้งครรภ์ผิดปกติจากการตรวจด้วยคลื่นเสียงความถี่สูง*

***คำสำคัญ**: อายุครรภ์, แก้ไขแล้ว, คลื่นเสียงความถี่สูง, มีข้อบ่งชี้, ไม่มีข้อบ่งชี้*

Introduction

Accurate gestational age (GA) is an important part of fetal growth assessment, abnormal maternal and fetal diagnosis and planning of pregnancy management. Clinical information such as the last menstrual period (LMP), uterine size, and maternal perception of quickening accompanied by obstetric ultrasonography (US) are usually provided for GA documentation. Obstetric US measurement of mean gestational sac diameter (MSD), fetal crown-rump length (CRL) and biometric measurement, including biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC) and femur length (FL), are commonly used for US determination of GA[1]. The parameters chosen depend on fetal size and GA[1]. In Thailand, however, the Royal Thai College of Obstetricians and Gynecologists has used a prenatal guideline which states it would prefer Thai obstetricians to confirm fetal GA using ultrasonography since the year 2023[2]. Furthermore, regarding the availability of routine ultrasonography in general practice in Thailand, the situations of developing limited resources still differ between places. In private clinics or hospitals, nearly all pregnant women have their determined GA confirmed by US during the first antenatal care visit. This contrasts with rural areas, where determination of GA using clinical data is generally practiced. A study conducted by Sritippayawan et al found that among Thai women, GA re-dating after ultrasound occurred in about 25.4% of pregnancies[1]. Research on the use of US for GA determination is limited to clinically non-reliable (indicated US) cases. However, the incidence of GA re-dating after US examination for GA determination in pregnant women in Thailand is present in both clinically reliable (non-indicated US) and clinically non-reliable (indicated US) groups. Thus, we conducted this study. The main purpose of this study was to compare the incidence of GA re-dating after US examination for GA determination in pregnant women in Thailand between clinically reliable and clinically non-reliable groups. The second purpose was to present the incidence of GA re-dating in pregnant women overall, and the incidence of accidentally diagnosed abnormal pregnancy, such as multifetal gestations, embryonic/fetal demise, gestational trophoblastic disease, etc., as well as compare the discrepancy in duration of pregnancy between clinically reliable and clinically non-reliable groups. Finally, we identified clinical factors influencing the need for GA re-dating.

Materials and Methods

This analytic, cross-sectional study was conducted with healthy pregnant women who were scheduled for antenatal visits at the Antenatal Outpatient Unit, Department of Obstetrics and Gynecology, Faculty of Medicine, Srinakharinwirot

University, Thailand, between December 2022 and September 2023 and had a GA diagnosis bases on the clinical history less than 14 weeks. The exclusion criterion was as follows: pregnant women who had previously been documented for GA using US. The study was approved by the institute's ethics committee (SWUEC/E/M-068/2565) and was registered on the Thai Clinical Trials Registry (TCTR 20221022001). Informed consent from all participants was obtained.

The participants were asked to give their personal information, which included their maternal age, education level, parity, gravidity, occupation, religion, family income and LMP. Then, the clinical information for evaluating the reliability of clinically determined GA was asked for, which included regularity of menstruation, how they remembered the LMP, duration of hormonal contraceptive discontinuation, abnormal vaginal bleeding after pregnancy diagnosis, history of inpatient care for hyperemesis gravidarum, risk of multiple gestations and history of severe pelvic adhesion. Then, physical examination for uterine size was performed. Pelvic examination was not routinely performed. The date-size discrepancy was only diagnosed by abdominal examination. The participants were categorized into two groups: a clinically reliable (non-indicated US) group and a clinically non-reliable group (indicated US). A participant was defined as clinically non-reliable (indicated US) if she could not remember her last menstrual period, had an irregular menstrual cycle, had a menstrual interval of less than 21 or more than 35 days, had conceived during oral hormonal contraception use or within 24 weeks after receiving the last injectable hormonal contraception, had a history of multiple gestations in her family, had a history of abnormal vaginal bleeding in the current pregnancy, had significant pelvic pain, had a presence of hyperemesis gravidarum, or had a presence of date-size discrepancy[4]. Then, all participants underwent obstetric US examination performed by the last author listed in this study (T.H.), who became qualified in maternal fetal medicine practice at the Royal Thai College of Obstetricians and Gynaecologists (RTCOG) and had more than 15 years of experience in obstetric US. Abdominal (Abd) US was firstly performed in all participants and vaginal US was performed if the Abd US did not successfully depict an image which was proper enough for pregnancy identification and GA determination. Our US steps were as follows: A survey of the pelvic organ and evaluation of the presence or absence of an intrauterine gestational sac (IUGS) was performed. Then, if an IUGS was present, the presence of a yolk sac (YS) or embryo/fetus was subsequently documented. When an embryo/fetus was present, GA was determined based on CRL measurement (mean of three discrete measurements). If an IUGS was present without an embryo/fetus, undetermined pregnancy was recorded, and a follow-up appointment was made with the participant. In the present study, GA was determined by a fetus/embryo measurement. When the CRL was beyond 84 mm in length (approximately 140 weeks of gestation), a combination of BPD, HC, AC and FL measurement was used for GA determination. The recommended guideline for re-dating based on US is classified according to a GA range based on LMP[5]:

a. $\leq 8^{6/7}$ weeks of gestation: re-date when there is a discrepancy of more than 5 days between US dating and LMP or clinical dating.

b. $9^{0/7}$ to $13^{6/7}$ weeks of gestation: re-date when there is a discrepancy of more than 7 days between US dating and LMP or clinical dating.

c. $14^{0/7}$ to $15^{6/7}$ weeks of gestation: re-date when there is a discrepancy of more than 7 days between US dating and LMP or clinical dating.

d. $16^{0/7}$ to $21^{6/7}$ weeks of gestation: re-date when there is a discrepancy of more than 10 days between US dating and LMP or clinical dating.

Abnormal pregnancies, such as multiple gestations, anembryonic gestation, ectopic pregnancy, and embryonic/fetal demise, were recorded. The results of the US examination were recorded in a hospital-based system and reported to the primary doctor for antenatal management planning.

The required sample size was estimated by

using a formula for two independent proportions. In a previous study, 85% of pregnant women who were clinically non-reliable needed their GA re-dated after US. We expected that about 55% of the pregnant women who were clinically reliable would need their GA re-dated after US. To achieve an alpha error of 0.05 and a beta error of 0.1, the sample sizes required were around 47 participants for each group. Allowing for 15% lost or missing data, an approximate total of 110 participants were required.

The baseline characteristics of the participants within each group were examined by tabulating percentages, means and standard deviation. The numbers of participants who needed GA re-dating and had an abnormal pregnancy diagnosis were compared between the clinically non-reliable and the clinically reliable groups using the chi-square test. The difference in number of days in the participants needing GA re-dating between the clinically non-reliable and the clinically reliable groups was presented as median and interquartile range (IQR) and compared using the Mann-Whitney U test. Lastly, the possible factors associated with all participants who needed GA re-dating were identified using the independent t-test, chi-square test or Fisher's exact test. In all statistical tests, p values of < 0.05 were considered significant.

Results

A total of 119 pregnant women were enrolled in the study and divided into two groups of 57 and 62 participants in the clinically non-reliable and the clinically reliable group, respectively. After US, 11 (11/119, 9.24%) participants received an abnormal or complicated pregnancy diagnosis. The details of abnormal pregnancy are presented in Fig. 1. There were six (6/57, 10.53%) and five (5/62, 8.06%) participants in the clinically non-reliable and the clinically reliable groups, respectively, who were excluded from analysis because of abnormal pregnancy. Thus, 51 and 57 participants in the clinically non-reliable and the clinically reliable groups, respectively, were eventually analyzed (Fig. 1).

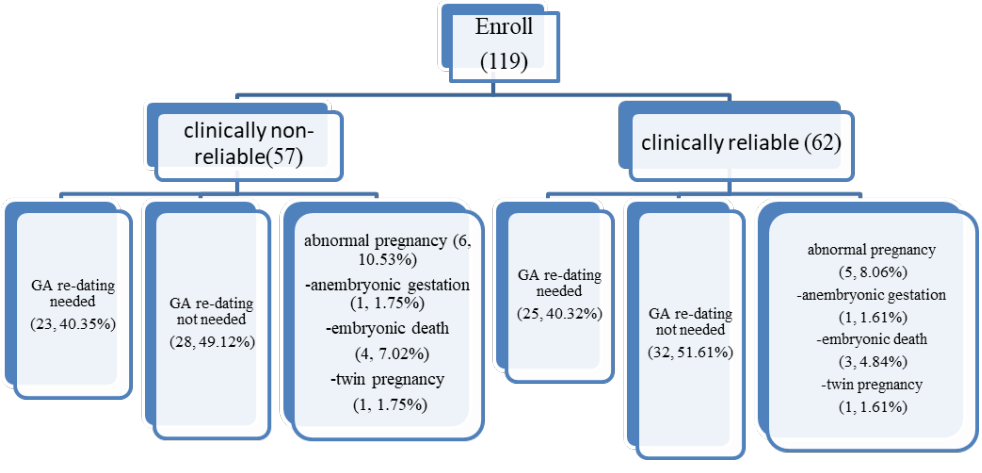

Fig. 1. Study diagram.

GA: gestational age

Table 1 presents the participants' baseline characteristics in both groups. The data in the two groups were compared. Table 2 presents a comparison of the numbers of participants who needed GA re-dating and had an abnormal pregnancy diagnosis between the clinically non-

reliable and the clinically reliable groups. They were similar in both groups. Table 3 presents a comparison of the difference in number of days in the participants needing GA re-dating between the clinically non-reliable and the clinically reliable groups. When focusing on participants needing GA re-dating, the difference in the number of days of GA re-dating between the clinically non-reliable and the clinically reliable groups was not statistically significant [10 (IQR 7.00-21.00) vs 12 (IQR 8.00-15.00) days, p = 0.872). Table 4 presents the possible factors associated with the need for GA re-dating. None of any clinical factors, which were useful to guidance it.

Table 1. Baseline characteristics (n = 119).

Characteristic	clinically reliable (n = 57)	clinically non-reliable (n = 62)
Age (years), mean ± SD	28.57 ± 6.031	28.86 ± 4.764
Religion, n (%)		
- Buddhist	47 (82.4)	51 (82.3)
- Muslim	9 (15.8)	8 (12.9)
- Christ	1 (1.8)	3 (4.8)
Occupation, n (%)		
- Employee	17 (29.8)	21 (33.9)
- Housewife	4 (7.0)	4 (6.5)
- Government officer	12 (21.1)	16 (25.8)
- Others	24 (42.1)	21 (33.9)
Location, n (%)		
- Nakhon Nayok	29 (50.9)	26 (41.9)
- Pathum Thani	22 (38.6)	33 (53.2)
- Bangkok	3 (5.3)	0 (0.0)
- Others	3 (5.3)	3 (4.8)
Level of education, n (%)		
- Less than primary school	21 (36.8)	14 (22.6)
- Primary school-bachelor	35 (61.4)	47 (75.8)
- Higher than bachelor	1 (1.8)	1 (1.6)
Family income (Bath)		
- < 15,000	15 (26.3)	12 (19.4)
- 15,000 – 29,999	26 (45.6)	23 (37.1)
- 30,000 – 50,000	15 (26.3)	22 (35.5)
- > 50,000	1 (1.8)	5 (8.1)
Primigravida, n (%)		
- Yes (G = 1)	22 (38.6)	33 (53.2)
- No (G ≥ 2)	35 (61.4)	29 (46.8)
Nulltiparous, n (%)		
- yes (p = 0)	26 (45.6)	34 (54.8)
- no (p ≥ 1)	31 (54.4)	28 (45.2)
History of abortion, n (%)		
- Yes	18 (31.6)	13 (21.0)
- No	39 (68.4)	49 (79.0)
GA based on LMP, n (%)		
- GA ≤ 8^{+6} weeks	29 (50.9)	29 (46.8)
- GA > 9 weeks	28 (49.1)	33 (53.2)

SD: standard deviation, GA: gestational age, LMP: last menstrual period

Table 2. Comparisons of the number of participants who gestational age re-dating needed and abnormal pregnancy diagnosis between clinically reliable and clinically non-reliable groups.

Group		Clinically non-reliable (51)	Clinically reliable (57)	Relative risk	95% CI	p value*
GA re-dating needed, n (%)	Yes (%)	23 (45.1)	25 (43.9)	1.001	0.674-1.488	0.995
	No (%)	28 (54.9)	32 (56.1)	-	-	-
Abnormal pregnancy diagnosis, n (%)	Yes (%)	6 (11.8)	5 (8.8)	1.133	0.638-2.011	0.686
	No (%)	45 (88.2)	52 (91.2)	-	-	-

* Chi-square test
CI: confidence interval

Table 3. Comparisons of the number of day difference in gestational age re-dating needed par-ticipants between clinically reliable and clinically non-reliable groups.

Group	Day		p value*
	Median	IQR	
clinically non-reliable	10	07.00 - 21.00	0.872
clinically reliable	12	08.00 - 15.00	

* Mann-Whitney U test
IQR: interquartile range

Table 4. Possible factors associated with gestational age re-dating needed.

Factors	GA re-dating needed (n = 48)	GA re-dating not needed (n = 60)	Relative risk	95% CI	p value
Religion, n (%)					
- Buddhist	40 (83.3)	54 (90.0)	0.898	0.529 - 1.525	0.699*
- Muslim and Christ	8 (16.7)	6 (10.0)			
Occupation, n (%)					
- Employee	18 (37.5)	18 (30.0)	1.242	0.812 - 1.900	0.330*
- Others	30 (62.5)	42 (70.0)			
Location, n (%)					
- Nakhon Nayok	46 (95.8)	59 (98.3)	1.168	0.465 - 2.933	1.000**
- Others	2 (4.2)	1 (1.7)			
Level of education, n (%)					
- Less than primary school	18 (37.5)	16 (26.7)	1.349	0.887 - 2.052	0.178*
- Primary school - higher than bachelor	30 (62.5)	44 (73.3)			
Family income (Bath)					
- < 15,000	10 (20.8)	15 (25.0)	0.903	0.529 - 1.540	0.701*
- ≥ 15,000	38 (79.2)	45 (75.0)			
Primigravida, n (%)					
- Yes (G = 1)	20 (41.7)	31 (51.7)	0.838	0.544 - 1.292	0.420*
- No (G > 1)	28 (58.3)	29 (48.3)			

* Chi-square test, **Fisher's exact test
GA: gestational age, CI: confidence interval

Discussion

GA is an important piece of information for obstetric care planning and management. Although the prenatal guideline which was announced by the RTCOG suggested dating GA using US for all pregnant women as early as possible, it is still not available due to the reasons of limited resources and performance of clinical practice according to the familiarity of public health personnel. In any case, most Thai practice guidelines on obstetric care management reference studies from developed countries. The current study is the first study which has evaluated the rate of GA re-dating after US examination during first-trimester prenatal care, dividing the patients into clinically reliable and clinically non-reliable groups using the decisions made by physicians after analyzing patient histories and performing physical examinations. The rationale behind this study is the actual practice in Thailand. Therefore, our findings represent the real situation in our country and may be useful for other developing countries. In the current study, we found that the classification of the pregnant women into clinically reliable or non-reliable groups was sometimes difficult and awkward due to patient recall of the LMP date, and morning sickness symptoms without serum electrolyte assessment that should have been assessed for hyperemesis gravidarum. Our study found that 57/119 (47.89%) of participants were indicated for US, mainly due to the fact they could not recall their menstrual period. This incidence was comparable to that of a previous study, which found that approximately one half of pregnant women could accurately recall their LMP[5-7]. In our study, we classified participants as reasonably as possible. According to the results presented, nearly half (59/119, 49.58%) of all participants needed GA re-dating or were found to have an abnormal pregnancy which needed specific obstetric management. The rate of participants needing GA re-dating was quite high. Moreover, the rates of participants needing GA re-dating were compared between the clinically non-reliable and the clinically reliable groups (47.9% vs 52.1%, prevalence rate ratio = 1.001, p = 0.995). This indicates that clinical information might not be properly used for GA determination. If there is no US performance, nearly half of all pregnant women may have a non-reliable GA until further gestation. The reasons for clinical non-reliability in this study and previous studies, such as inability to remember the exact date of menstruation because of amenorrhea, irregular menstrual cycles, abnormal vaginal bleeding during the current pregnancy and use of hormonal contraception, were similar[6]. Previous studies, most of which were carried out more than 10 years ago, had a GA of enrolled participants which was higher than that of our current study and used the second trimester US fetal biometry (BPD) for the studies[6-9]. However, critical concerns regarding universal US were postulated by previous studies, which were financial factors, operator exhaustion, and female feticide, in some settings[9-10]. In Thailand, financial factors and operator exhaustion were also concerns, and this may be similar in settings of other developing countries where US is still a limited resource. Female feticide may be less concerning in our study because US was performed before 14 weeks of gestation, which is a period when sex determination is not definitely accurate, especially before 12 weeks of gestation[11]. A previous study reported an accuracy of approximately 91% in the 11th and 12th week of pregnancy[12]. Moreover, non-invasive prenatal testing has been found to be more accurate than US for sex determination at similar earlier GA to those in our study[13]. In order to provide suggested GA for use with US aiming for GA determination, previous studies included participant GA which were higher than those in our current study. Interestingly, the incidence of GA needing re-dating was similar[14-15]. Thus, we suggest that GA determination be performed as early as possible. A GA of less than 14 weeks is preferred because the larger fetal measurement introduces greater variability of GA determination. In any case, CRL measurement is more suggested than mean sac diameter measurement[5]. In the reliable group, the need for re-dating may arise from variations in the

interval periods. Errors are more likely when evaluation is delayed. Moreover, another benefit of US during the first trimester is the accidental detection of abnormal or complicated pregnancies such as embryonic/fetal death, anembryonic gestation and multiple pregnancies[16]. Determination of twin chorionicity has been found to be more accurate in early pregnancy than in later pregnancy[17]. In other 2 studies published in BMC Pregnancy and Childbirth, both studies underscored the significance of early ultrasound in Asian populations, including Thailand, for accurately determining GA and reducing the incidence of re-dating. They highlighted the utility of early ultrasound as a critical tool in prenatal care, ensuring better pregnancy management outcomes[18-19].

Our study is the first study which has evaluated the number of days difference in participants needing GA re-dating between the clinically non-reliable and the clinically reliable groups. The median values of the number of days difference were around 10 and 12 days in the clinically non-reliable and the clinically reliable groups, respectively, and were comparable. We feel that more than 10 days difference is clinically important for obstetric decision-making in the case of pregnancy complications such as preterm labor, premature rupture of membranes or occurrence of abnormal bleeding. In the incidence of needing GA re-dating, both abnormal pregnancy detection and the number of days difference support an obstetrician's decision to perform US during the first trimester of pregnancy with all pregnant women regardless of whether clinical information is necessary or not.

Besides that, we were interested in finding out the possible factors associated with the need for GA re-dating. Our study failed to identify any significant possible factors associated with needing GA re-dating, including religion, occupation, living location, level of education, economic status and gravidity. This was different from a previous study which found that there was a trend toward expected-due-date modification with increasing gravidity[14]. This may have been caused by the difference in main outcome measurement. We focused on GA re-dating which was classified by the range of duration, but the previous study focused on the point of expected-due-date modification. In any case, the influence of this factor was found only to be a trend but was not strongly associated. Therefore, we support universal US examination for GA determination as early as possible without clinical factor adjustment.

The association of early GA re-dating using US with pregnancy and neonatal outcome has not been covered in the present study. This was a limitation of our study. A previous study showed that pregnancy dating using the LMP alone tended to overestimate the duration of gestation[9]. This study was a retrospective study and the GA of most of their participants was more than 10 weeks of gestation (22% of participants had a GA of less than 10 weeks). Thus, the pregnancy and neonatal outcome may be differently found. Therefore, further study is planned.

Conclusion

In conclusion, nearly half of the pregnant women needed GA re-dating when undergoing US in the first trimester of pregnancy. The rate of GA re-dating was similar in the clinically reliable and clinically non-reliable groups without any hint of clinical factor influence. Therefore, we suggest universal US aiming for GA determination as much as and as early as possible.

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Potential conflicts of interest

The author declares no conflicts of interest.

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