Chapter 5

Application of standard fundal height growth curve for screening term LBW infants

Term low birth weight infant (LBW) refers to a baby that was born between gestational age 37 and 42 weeks and had birth weight less than 2,500 g which constitutes a small or IUGR infant.[1] Those conditions are still important problems for maternal and child health care systems in developing countries. In 2010, the prevalence of term LBW infants in 138 countries with middle to low income were 8.8% (10.6 out of 120.5 million of total births) and majority of these infants were in Asia.[2] Thailand shows a prevalence of preterm LBW infants of 7.0% and term LBW infants of 9.0%.[3] Most term LBW infants are term SGA fetuses which may affect the mother and fetus for the whole period of pregnancy until postpartum including perinatal morbidity and mortality such as hypothermia, birth asphyxia, meconium aspiration syndrome, hypoglycemia and polycythemia.[4, 5] Moreover, these will increase the risk for long term morbidity including poor neurobehavioral function, type 2 diabetes mellitus,[5, 6] coronary heart disease, hypertension and stroke in adulthood.[7] Therefore, when healthcare providers can detect and screen pregnant women who are prone to have term LBW infants early during the antenatal period they will be able to plan and provide care effectively to prevent these long term affects.

FH growth curve patterns for screening term LBW infants

Related studies have shown that the standard FH growth curve is still useful for screening and detecting abnormal fetal growth[8-10] which may lead to term LBW infants and reported the ability to detect SGA or IUGR fetus will increase when examiners plot FH in centimeters on suitable FH growth charts at every antenatal care visit[9] because height of fundus presents dynamic change depending on intrauterine cavity passenger, i.e., fetus, placenta and amniotic fluid and other factors where fetal size is the most important factor influencing the change of FH.[11, 12] Therefore, plotting a series of FH measurement on SFHGC is similar to monitoring fetal growth compared with normal baseline for the whole pregnancy period. FH growth curve patterns probably show the approximate intrauterine growth of the fetus. Small for gestational age fetuses or fetuses with slow intrauterine growth rate should be recognized by a deviation from norm of SFHGC, as shown both by the growth pattern and the timing at which the abnormality was detected.[13, 14]

The majority of studies normally focus on finding normal values of FH in centimeters for each week of gestation, FH growth curves for a population in a specific region[10] or customized antenatal charts,[15, 16] but no study has focused on describing the change of FH growth curve patterns to be able to use as guidelines to screen abnormal fetal growth. Thus, to study the characteristics of FH growth curve patterns for pregnant women with term LBW infants compared with SFHGC would tend to be useful to properly screen these infants.

In 2013, Deeluea et al.[17] studied patterns of FH growth curves among pregnant women with term LBW infants from a cohort that was used to establish the standard FH growth curve for Thai women. During the study period, a total of 2,351 pregnant women attended an ANC clinic and delivered in the four settings. A total of 75 eligible subjects (3.2%) delivered term

LBW infants. FH in centimeters of eligible subjects were plotted on standard FH growth curves for Thai women at every antenatal visit throughout the pregnancy. Three researchers summarized six patterns of FH growth curves among pregnant women with term LBW infants resulting in the patterns listed below.

1. Pattern I: FH below or around the 10th percentile line from beginning until delivery (22.7%)
2. Pattern II: FH below normal in early, reaching up to a normal, and after that slowed or static or decreased (25.3%)
3. Pattern III: FH normal in early, then slowed or static or decreased (22.7%)
4. Pattern IV: FH normal in early, then slowed or static or decreased and reached up to normal (8.0%)
5. Pattern V: FH normal from beginning until term except for the last visit (8.0%)
6. Pattern VI: FH normal from beginning until delivery (13.3%)

The examples of each pattern are shown in Figure 5.1. Five patterns deviated from the norm of standard FH growth curves for Thai women, i.e., Patterns I, II, III, IV and V. Patterns I-IV were able to detect from early pregnancy (Figures 5.1-A, B, C, and D) and Pattern V was able to detect only before or at delivery (Figure 5.1-E). Another pattern, Pattern VI, failed to detect term LBW infants (Figure 5.1-F) which might have been because FH does not only reflect the size of the fetus, but may be influenced by the other factors such as amniotic fluid volume, position of the fetus, maternal body structure and pelvic types, which then resulted in patterns of FH and unable to detect all term LBW infants.

The discussion above demonstrates that SGA or IUGR fetus surveillance is suggested when FH is lower than the 10th percentile or increases to less than normal level, constant, or decreased. Moreover, pregnant women who have risk factors for an IUGR fetus or term LBW infant but have normal FH in centimeters and patterns of FH growth curve, or who have inaccurate FH measurement such as extremely obese (prepregnancy BMI>35 kg/m^2), large uterine fibroids and polyhydramnios, might need to monitor fetal growth by other selective procedures such as ultrasound scanning, uterine or umbilical artery Doppler.[1, 18]

In conclusion the patterns of FH growth curves found among pregnant women with term LBW infants may be used to detect pregnant women who tend to deliver infants with birth weight less than 2,500 g from early pregnancy to the day of admission for delivery. This screening may detect up to 80% of future term LBW infants. Thus, it might be used as a guideline or a primary tool to monitor and screen these infants, from early pregnancy.

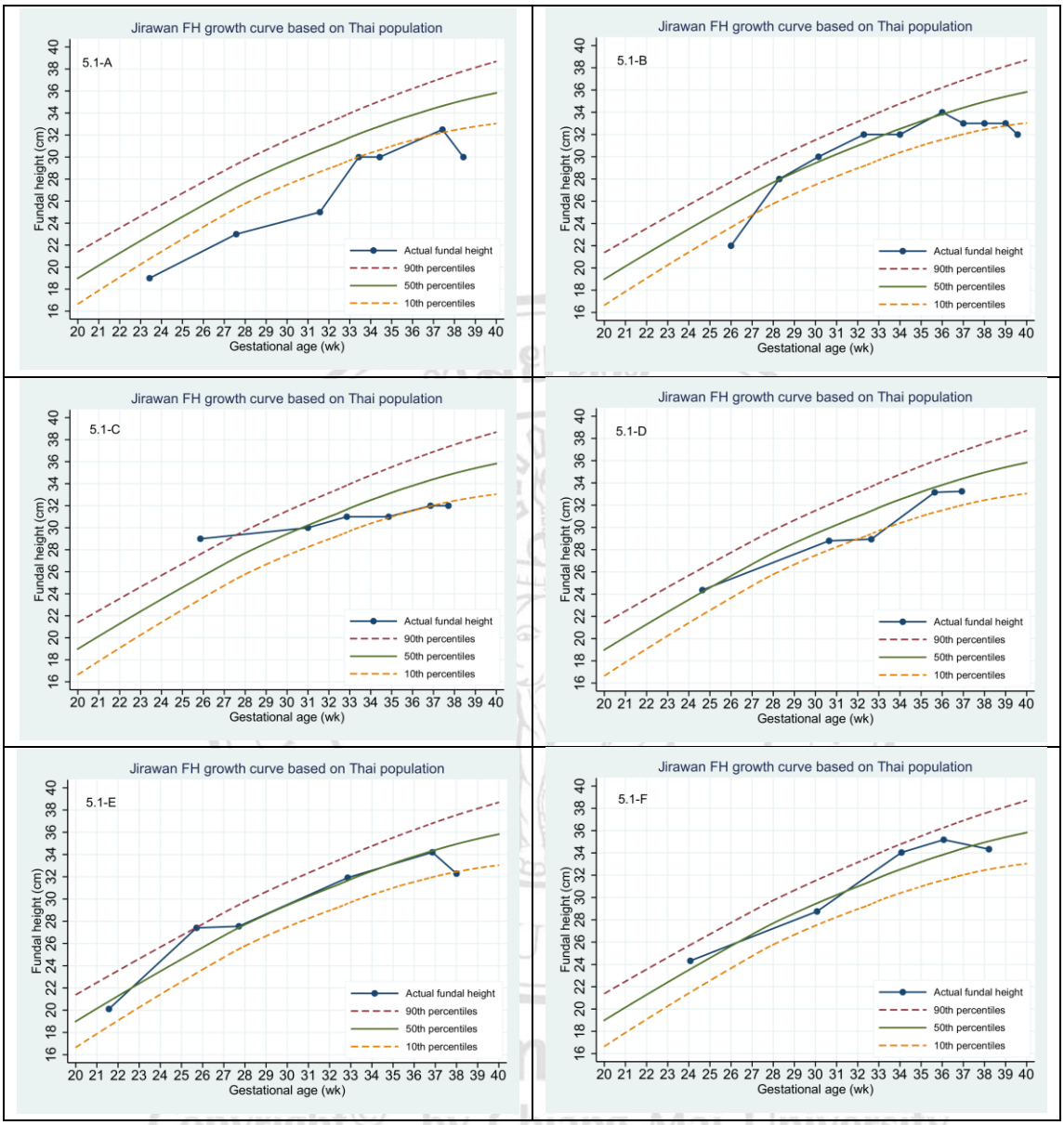

Figure 5.1 Examples of six patterns of fundal height growth curve among pregnant women with term LBW infants: (A) Pattern I; (B) Pattern II; (C) Pattern III; (D) Pattern IV; (E) Pattern V; and (F) Pattern VI.[17]

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