Nuchal Translucency in Normal Fetuses in a Thai Population

PANYU PANBURANA, M.D.*, SAUWAKON AJJIMAKORN, M.D.*,
ADITHEP JAOVISIDH, M.D.*, PONGLADDA TUNGKAJIWANGOON, B.Sc*

Abstract

The purpose was to study nuchal translucency thickness of normal Thai fetuses in the first trimester. From January 1996 to June 1999, there were 1,970 pregnant women, whose gestational ages were between 10 to 13^{+6} weeks of gestation, who attended the Down syndrome screening clinic. Nuchal translucency (NT) thickness measurement was used as the screening method for Down syndrome. When the result showed an increased risk for Down syndrome, the patient was counselled and the invasive test for the definite diagnosis was optional. Pregnant women who had had an abortion and/or congenital anomaly babies were excluded. Only pregnant women who had normal newborns were recruited in this study. There were 1,631 pregnant women who had normal newborns in this study. The mean maternal age was 28.70±5.14 years. There were 222 (13.6%) pregnant women whose ages were more than or equal to 35 years. There was quadratic correlation of an increase in nuchal translucency and the crown-rump length (CRL) in normal fetuses in the first trimester. The quadratic equation was $\log_{10} NT = 1215 \times 10^{-4} CRL - 8.7 \times 10^{-4} CRL^2 - 3.7037$. The normal fetuses with nuchal translucency thickness more than or equal to 2.5 mm were found in 1.23 per cent in this study. In conclusion, there was quadratic correlation of nuchal translucency thickness and crown-rump length of first trimester fetuses in a Thai population.

Key word : Nuchal Translucency, The First Trimester, Thai Population

PANBURANA P, AJJIMAKORN S, JAOVISIDH A, TUNGKAJIWANGOON P
J Med Assoc Thai 2002; 85: 245-249

* Down Syndrome Screening Clinic, Department of Obstetrics and Gynecology, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand.

Nuchal translucency (NT) is the area between skin and cervical spine fascia of the fetus. The measurement of NT is useful in detecting chromosomal defects, most of which involve autosomes [1,2]. Maternal age and fetal NT thickness have been combined to calculate individual risks of Down syndrome and is now proven to identify more than 80 per cent of affected fetuses for a false positive rate of about 5 per cent[3] but when maternal serum pregnancy associated protein A (PAPP-A) and free beta hCG are taken into account the detection rate of chromosomal defects is increased[4]. The correlation of NT thickness and crown-rump length was studied in normal fetuses in a Thai population in this research.

MATERIAL AND METHOD

One thousand nine hundred and seventy pregnant women between 10 to 13^{+6} weeks of gestation came to the Down syndrome screening clinic, Department of Obstetrics and Gynaecology, Ramathibodi Hospital, Mahidol University from January 1996 to June 1999. All women underwent transabdominal scanning (TAS) (Toshiba 140, TAS probe 5.0 MHz Toshiba PVF-5.00 Mt or Aloka SSD 2000). Two scans were performed to get the maximum NT thickness. Where difficulty in obtaining measurements was encountered with TAS, a transvaginal scan was performed. Nuchal translucency (NT) measurement was performed in the neutral position which was defined as the position where the angle between the sagittal spine and occiput was zero by transabdominal or transvaginal ultrasonography. When the result showed an increased risk for Down syndrome, definite diagnosis was optional after post-test counselling. The increased NT thickness was defined as more than or equal to 2.5 mm NT thickness.

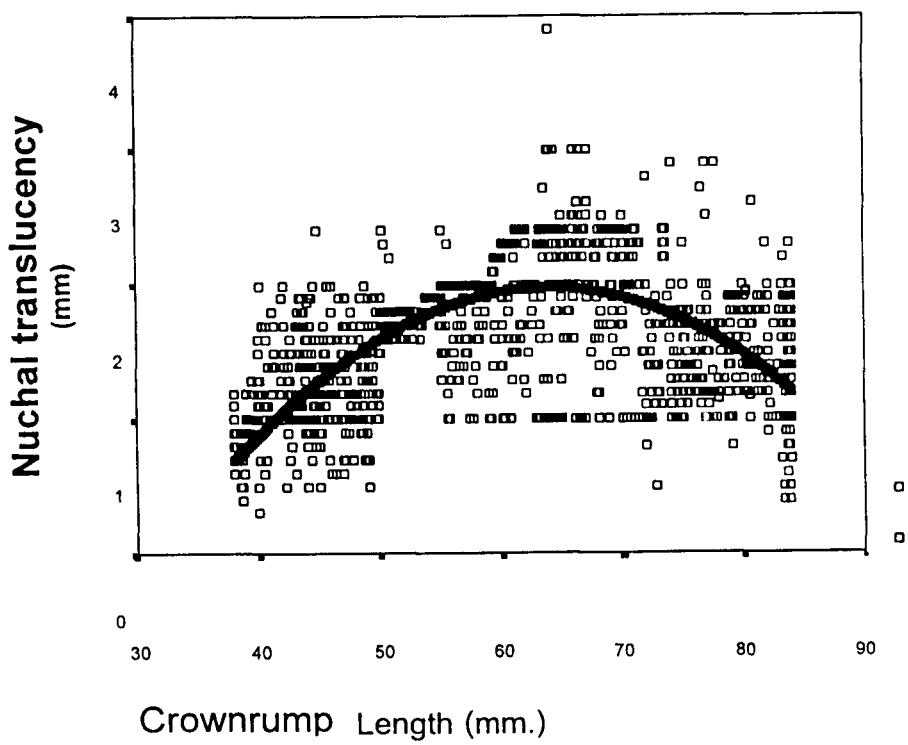

Fig. 1. This graph shows the correlation between nuchal translucency and the first trimester fetal crown-rump length in a Thai population.

Pregnant women who had had an abortion and/or congenital anomaly babies were excluded. Only pregnant women who had normal newborns were recruited in this study.

RESULTS

From 1,970 pregnant women between 10 to 13^{+6} weeks of gestation, there were 1,631 pregnant women who had normal newborns in this study. The mean maternal age was 28.71±0.13 years. There were 222 (13.6%) pregnant women whose ages were more than or equal to 35 years. There was correlation of an increase in NT and crown-rump length (CRL) in normal fetuses in the first trimester. This was the quadratic correlation which revealed an increase in NT measurement between 10 and 12 weeks of gestation and then a decrease at 10-13^{+6} weeks (Rsq=0.5388, P=0.00001) (Fig. 1). The quadratic equation was $\log_{10}$ NT=1215 x 10^{-4} CRL-8.7 x 10^{-4} CRL^2-3.7037. The normal fetuses with NT thickness more than or equal to 2.5 mm were found in 1.23 per cent in this study.

DISCUSSION

This is the first report of NT in normal first trimester fetuses during 10 to 13^{+6} weeks' gestation in Thai people. It is essential to follow the criteria to measure NT. A good sagital section of the fetus for measurement of fetal crown-rump length should be obtained. The fetal head should be in line with the spine and it should not be hyperextended or flexed[5]. There was an increase in NT thickness from 10 to 12 weeks and then decreased from 13^{+1} to 13^{+6} weeks of gestation. A progressive increase and subsequent decrease in NT thickness occurred with advancing gestation in most fetuses. This result is similar to studies in Europe[6,7]. The correlation of NT and CRL was in quadratic equation. There were 1.23 per cent of the fetuses that had NT more than or equal to 2.5 mm. Therefore, if 2.5 mm was used as the cutoff point for the increased NT, the false positive rate would be around 1.23 per cent. Increased NT was found in trisomy 13, 18 and 21 in our study. Pandya reported that the NT thickness was above the 95th centile of the normal range in about 77 per cent of trisomy 21 fetuses[3]. A study of 1,015 pregnancies with increased fetal NT thickness at 10-14 weeks of gestation revealed the number of trisomies 21, 18 and 13 in fetuses with translucency of 3 mm, 4 mm, 5 mm and > 6 mm were approximately 3-times, 18-times, 28-times, and 36-times higher than the respective number expected on the basis of maternal age[3]. Many studies revealed increased NT in association with congenital heart diseases, diaphragmatic hernia, congenital infection and hydrops fetalis[8-12]. The authors also detected increased NT with congenital heart disease in the Down syndrome screening clinic. The screening programme for Down syndrome which includes the biochemical study (free beta hCG and Pregnancy associated plasma protein A) to the NT measurement can increase the sensitivity of the test[13-16].

In conclusion, there was quadratic correlation of nuchal translucency thickness and crown-rump length of first trimester fetuses in a Thai population.

(Received for publication on August 29, 2001)

REFERENCES

1. Nicolaides KH, Azar G, Byrne D, Mansur C, Marks K. Fetal nuchal translucency : Ultrasound secreening for chromosomal defects in first trimester of pregnancy. Br Med J 1992; 304: 867-9.
2. Snijders RJM, Johnson S, Sebire NJ, Noble PL, Nicolaides KH. First trimester ultrasound screening for chromosomal defects. Ultrasound Obstet Gynecol 1996; 7: 216-26.
3. Pandya PP, Snijders RJM, Johnson SJ, Brizot M, Nicolaides KH. Screening for fetal trisomies by maternal age and fetal nuchal translucency thickness at 10 to 14 weeks of gestation. Br J Obstet Gynaecol 1995; 102: 957-62.
4. de Graaf IM, Cuckle HS, Pajkrt E, Leschot NJ, Belker OP, van Lith JM. Co-variables in first trimester maternal serum screening. Prenat Diagn 2000; 20: 186-9.
5. Whitlow BJ, Chatzipapas IK, Economides DL. The effect of fetal neck position on nuchal translucency measurement. Br J Obstet Gynaecol 1998; 105: 872-6.
6. Braithwaite JM, Morris KW, Economides DL. Nuchal translucency measurements : Frequency distribution and changes with gestation in a general population. Br J Obstet Gynaecol 1996; 101: 1201-4.
7. Pajkrt E, de Graff IM, Mol BW, van Lith JM, Belker OP, Bilardo CM. Weekly nuchal translucency measurement in normal fetuses. Obstet Gynecol 1998; 91: 208-11.
8. Snijders RJM, Pandya P, Brizot ML, et al. First trimester fetal nuchal translucency. In: Snijders RJM and Nicolaides KH, eds. Ultrasound markers for fetal chromosomal defects. Parthenon Publishing Group. New York 1996: 121-2.
9. Carvalho JS. Nuchal translucency, ductus venosus and congenital heart diseases : An important association cautious analysis. Ultrasound Obstet Gynecol 1999; 14: 302-6.
10. Markeson G, Coreia LA, Cohn G, Bayer L, Kanaan C. Parvoviral infection associated with increased nuchal translucency : A case report. J Perinatal 2000; 20:129-31.
11. Bilardo CM, Muller MA, Pajkrt E. Outcome of fetuses with increased nuchal translucency. Curr Opin Obstet Gynecol 2001; 13: 169-74.
12. Shulman LP, Phillips OP, Emerson DS, Felker RE, Tharapet AT. Fetal space-suit hydrops in the first trimester : Differentiating risk for chromosome abnormalities by delineating characteristics of nuchal translucency. Prenat Diagn 2000; 20: 30-2.
13. Hyett J, Perdu M, Sharland G, Snijders R, Nicolaides KH. Using fetal nuchal translucency to screen for major congenital cardiac defects at 10-14 weeks of gestation: population based cohort study. BMJ 1999; 318: 81-5.
14. Krantz DA, Larsen JW, Buchanan PD, Macri JN. First trimester Down syndrome screening: Free beta human chorionic gonadotropin and pregnancy-associated protein A. Am J Obstet Gynecol 1996; 174: 612-6.
15. Forest JC, Masse J, Moutquin JM. Screening for Down syndrome during first trimester: A prospective study using free beta-human chorionic gonadotgropin and pregnancy-associated plasma protein A. Clin Biochem 1997; 30: 333-8.
16. Irene M. de Graaf, Eva P, Caterina MB, Nico JL, Howard SC, Jan MM van Lith. Early pregnancy screening for fetal aneuploidy with serum markers and nuchal translucency. Prenat Diagn 1999; 19: 458-62.

ความหนาของ Nuchal Translucency ของทารกในครรภ์ในประชากรไทย

พัญญ พันธ์บูรณะ, พ.บ., เสาวคนธ์ อัจจิมากร, พ.บ.*,*
อดิเทพ เชาว์วิศิษฐ์, พ.บ., พงษ์ลดา ตังคจิวางกูร, วท.บ.**

วัตถุประสงค์ของการศึกษาวิจัยนี้เพื่อวัดความหนาของพื้นที่ระหว่างผิวหนังกับเยื่อหุ้มกระดูกสันหลังระดับต้นคอ (Nuchal Translucency, NT) ของทารกในครรภ์ในช่วงไตรมาสแรกในประชากรไทย ตั้งแต่มกราคม 2539 - มิถุนายน 2542 พบว่าสตรีตั้งครรภ์จำนวน 1,970 ราย มารับบริการที่คลินิกหลังจากได้รับคำปรึกษาแนะนำทางพันธุกรรมแล้ว จึงใช้การวัด NT เป็นการตรวจกรองทารกกลุ่มอาการดาวน์ในครรภ์มารดา โดยถ้าผลการตรวจกรองพบว่ามีความเสี่ยงสูงต่อการตั้งครรภ์ทารกกลุ่มอาการดาวน์จึงให้คำปรึกษาแนะนำทางพันธุกรรมโดยมีการตรวจจำเพาะเป็นทางเลือกให้แก่ผู้รับบริการต่อไป อนึ่งสตรีตั้งครรภ์ที่แท้งบุตร หรือมีความผิดปกติของทารกแต่กำเนิดจะถูกคัดออกจากการศึกษาวิจัย จากการศึกษาพบว่าสตรีตั้งครรภ์จำนวน 1,631 รายคลอดทารกปกติ มารดามีอายุเฉลี่ยเท่ากับ 28.70±5.14 ปี และพบว่ามีมารดาที่มีอายุมากกว่าหรือเท่ากับ 35 ปีจำนวน 222 ราย (13.6%) จากการศึกษาพบว่าการเพิ่มขึ้นของ NT และ Crown-rump length (CRL) ในไตรมาสแรกมีความสัมพันธ์ดังสมการ $\log_{10}NT = 1,215 \times 10^{-4}$ CRL-8.70×10^{-4} CRL^2-3.70 และพบว่าทารกที่มี NT หนากว่าหรือเท่ากับ 2.5 มม. มีร้อยละ 1.23 กล่าวโดยสรุปแล้ว ความสัมพันธ์ของ NT และ CRL ของทารกปกติในไตรมาสแรกในประชากรไทยเป็นแบบควอเดรติก (Quadratic correlation)

คำสำคัญ : Nuchal translucency, ไตรมาสแรก, ประชากรไทย

พัญญ พันธ์บูรณะ, เสาวคนธ์ อัจจิมากร,
อดิเทพ เชาว์วิศิษฐ์, พงษ์ลดา ตังคจิวางกูร
จดหมายเหตุทางแพทย์ ฯ 2545; 85: 245-249

* ภาควิชาสูติศาสตร์-นรีเวชวิทยา, คณะแพทยศาสตร์ โรงพยาบาลรามาธิบดี, มหาวิทยาลัยมหิดล, กรุงเทพ ฯ 10400