



VARIATION OF NUCHAL TRANSLUCENCY MEASUREMENT IN FIRST TRIMESTER

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ABSTRACT

Objective To evaluate the variation of nuchal translucency measurement in the first trimester and to assess it in normal and their increased for detected the abnormal fetus. **Martial and method** This is prospective study was assess the variation of NT length and it was depended for comparing of researches which did in some places because my country poor for detected and determination the nuchal translucency **Result** there are variation in normal measurement of nuchal translucency, all of them arrange between (1.2 ---- 3.5 mm) above is a powerful marker for abnormalities baby. **Conclusion** Variations in nuchal translucency measurement were found. They range between 1.2 to 3.5 any increase more than 3.5 is a sign for chromosomal, heart or abdominal wall defect.

INTRODUCTION

Nuchal translucency is a collection of fluid under the skin at the back of the baby neck. The amount of fluid is measured during a nuchal translucency ultrasound scan between the 11th and 14th week of pregnancy. When the baby length value (CRL) is between 45mm to 84mm all the developing babies had fluid at the back of there neck but many babies with chromosomal, heart or abdominal defect have an increased amount of fluid. An NT scan must take place at particular time in pregnancy between 11th and 14th week its too late to do the NT scan after the 14 week as any excess nuchal fluid may be absorbed by the baby developing lymphatic system.^[1]

An early ultrasound scan should be offered at 11-14 weeks, to determine gestational age and detect multiple pregnancies. It may also be part of the screening for fetal anomalies when the nuchal translucency is measured. Accurate gestational age assessment helps optimal antenatal care by, for example, reducing the need for induction of labour at > 41 weeks. Crown-rump length is the best surrogate measure of gestational age in the first trimester.

Nuchal translucency (NT) measurement in the first trimester is a powerful marker for Down syndrome. The combination of NT with serum markers in the first trimester detects 87% of cases of Down syndrome for a 5% false-positive rate. NT is also often increased in fetuses with a variety of other genetic conditions, including trisomies 13 and 18, Turner syndrome and triploidy, as well as structural birth defects such as congenital heart defects.

First-Trimester Ultrasound Examination

Embryonic/fetal anatomy appropriate for the first trimester should be assessed.

The nuchal region should be imaged, and abnormalities such as cystic hygroma should be documented.

For those patients desiring to assess their individual risk of fetal aneuploidy, a very specific measurement of the NT during a specific age interval is necessary (as determined by the laboratory used). See the guidelines for this measurement below. NT measurements should be used (in conjunction with serum biochemistry) to determine the risk of having a fetus with aneuploidy or other anatomic abnormalities such as heart defects. In this setting, it is important that the practitioner measure the NT according to established guidelines for measurement. A quality assessment program is recommended to ensure that false-positive and false-negative results are kept to a minimum.

Guidelines for NT Measurement

- i. The margins of the NT edges must be clear enough for proper placement of the calipers.
- ii. The fetus must be in the midsagittal plane.
- iii. The image must be magnified so that it is filled by the fetal head, neck, and upper thorax.
- iv. The fetal neck must be in a neutral position, not flexed and not hyperextended.
- v. The amnion must be seen as separate from the NT line.
- vi. The + calipers on the ultrasound must be used to perform the NT measurement.

vii. Electronic calipers must be placed on the inner borders of the nuchal line space with none of the horizontal crossbar itself protruding into the space.

viii. The calipers must be placed perpendicular to the long axis of the fetus.

ix. The measurement must be obtained at the widest space of the NT.^[2]

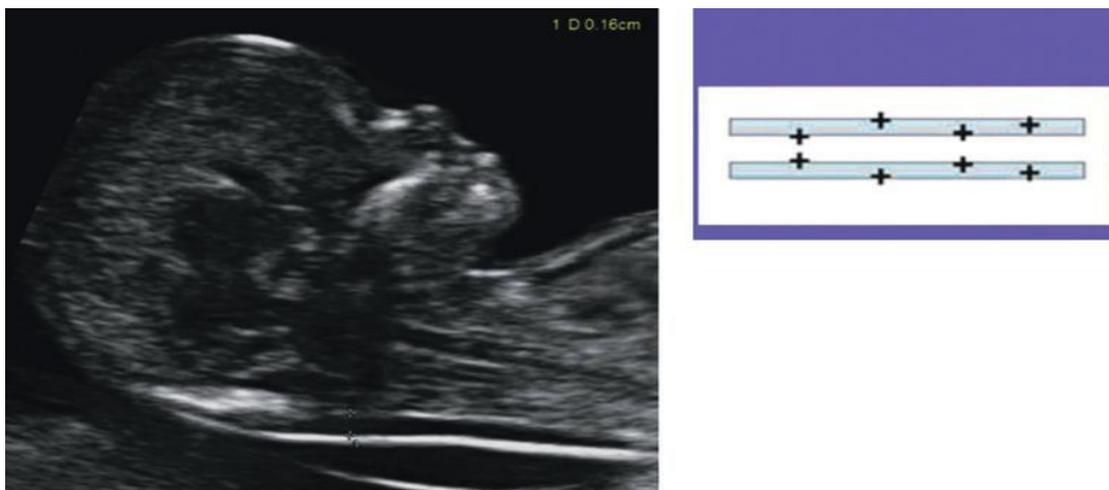


Figure 1: How to measure the nuchal translucency.

Nuchal Translucency Normal Range Chart

When the nuchal scan is done, the doctor will share the results with you. At that time, it is important to understand what a normal measurement is. For a baby that is between 45 mm and 84 mm in size, a normal measurement is anything less than 3.5 mm. The NT grows in proportion to the baby.

A doctor considers any baby with an NT less than 1.3 mm to be low-risk in terms of Down syndrome. Meanwhile, a baby with an NT of 6 is considered high risk for Down syndrome and also other potential chromosomal abnormalities. The chart below shows typical measurements considered normal at that stage of development.^[3]

Table 1. 1: normal measurement of nuchal translucency.^[3]

Pregnancy Mark	Normal Measurement
At 11 Weeks	Up to 2mm *Note: 9 of 10 babies with thickness 2.5-3.5mm will be normal.
12-13 Weeks	1.7mm (50 th percentile thickness) 2.8mm (95 th percentile thickness)

MATERIAL AND METHOD

This study is depended for comparing of researches which did in some places because my country poor for detected and determination the nuchal translucency.

RESULT

There are variation in normal measurement of nuchal translucency, all of them arrange between 1.2 ---- 3.5 above is a powerful marker for abnormalities baby.

Table 2: variation of NT in different place.

	weeks	CRL	NT
Isfahan province Iran 2013	11-13	50 - 67.70	1.3±0.54
Baby centre	11-14	45- 84	1.8- 3.3
Dr Bruno, Dr Muzio. AProffrank . Genllard et, al	11-13	45-84	2.2-2.8
Emerging health technologies CADTH	11-13	45-84	1.2 -1.9
New Health Advisor for Daily Health Care	11-13	45-84	2 - 2.8

DISSECTION

Several reports from different parts of the worlds and Iran have demonstrated the utility of NT measurement for screening different chromosomal and non chromosomal abnormalities.^[4,5,6,7]

Most of the studies have used the recommended definition for NT thickness by the FMF (i.e., 2.5-3 mm),^[8] whereas recent studies reported that using NT thickness as a continuous variable was more appropriate than using a single cutoff value for the fetal NT and consequently, the outcomes of its increased values and

screening programs.^[9] So, establishment of reference values of NT have been developed in different regions and ethnic groups worldwide.

Though there were studies in Iran, which investigated the association between increased NT value and Down syndrome^[6] and adverse pregnancy outcome including miscarriage, fetal loss, and fetal abnormalities,^[7] there was not any study, which reported the normative value of NT thickness for the Iranian population. So, this study was designed to determine the ethnic specific reference value of NT thickness for pregnant Iranian women. Our results indicated that the median NT thicknesses for a CRL between 45 mm and 80 mm ranged from 1.00 to 1.65 mm, and the 95th percentiles ranged from 1.8 to 2.35 mm. The median NT thickness for GA were 1.0 mm, 1.2 mm, and 1.4 mm for gestational age of 11 weeks, 12 weeks, and 13 weeks, respectively, and the 95th percentiles of NT thickness were 1.8, 1.9, and 2.2 for gestational age of 11 weeks, 12 weeks, and 13 weeks, respectively.

The distribution of the NT thickness for CRL has been reported in many studies. The median NT thicknesses has been reported to be 1.2-1.9 mm, 1.22-2.10 mm, and 1.19-1.73 mm for a CRL between 45 mm and 80 mm in Japan, Korea, and Brazil, respectively.^[10,11,12] Our reported median value was lower than the other reports.

The 95th NT thickness percentiles have been reported to be 2.1-3.2 mm, 2.14-2.3 mm, 1.57-2.10 mm, 1.00-2.90 mm, and 1.84-2.35 mm for a CRL between 45 mm and 80 mm in Japan, Korea, Brazil, Thailand, and China, respectively.^[10,11,12,13,14] Our results were similar to the reported reference value range of Brazil.^[12] Although there was no report from the Eastern Mediterranean region in this field, the values were not similar to the values reported from the Asian countries.

Reported variations in the index measurements in the different studies might have been due to factors such as radiologist experience, quality of the ultrasound, method of measurement, and an inappropriate fetal and nuchal cord position. In addition, as mentioned by Kor-anantaku *et al.* in Thailand some investigators have considered the average of two or three measurements of NT thickness, whereas others considered the largest measurement.^[13]

In this study, we determined the reference values of NT thickness among pregnant Isfahani women to evaluate the role of ethnicity on the normative value of NT as well as the association of increased NT thickness with chromosomal and nonchromosomal abnormalities during the first trimester. The results indicated that the reference 95th percentile value range for NT was 1.8-2.35 and increased NT thickness according to our obtained values was associated significantly with chromosomal abnormalities.^[15]

All women should be offered prenatal screening or diagnostic testing for aneuploidy, regardless of maternal age, but with the increasing number of prenatal screening options now available, deciding which is the most appropriate test is increasingly complex. Nuchal translucency (NT) measurement in the first trimester is a powerful marker for Down syndrome. The combination of NT with serum markers in the first trimester detects 87% of cases of Down syndrome for a 5% false-positive rate. NT is also often increased in fetuses with a variety of other genetic conditions, including trisomies 13 and 18, Turner syndrome and triploidy, as well as structural birth defects such as congenital heart defects.^[16]

In Egypt, two hundred selected women with viable pregnancies were recruited in this prospective study. All underwent 4D ultrasound at 11-14 completed weeks of gestation for NT measurement. They were classified into 3 groups according to NT thickness: Group I NT < 3.5 mm, group II NT between 3.5 and 4.4 mm and group III NT > 4.4 mm. Statistical analysis was done using Chi-square test for qualitative data between the three groups with significant correlation at p value ≤ 0.05 .

Out of 200 pregnant women, 30 was missed follow-up while 159 live birth and 11 pregnancies were terminated by abortion postnatal (n = 2), spontaneous (n = 3) or artificial (n = 6). The highest median maternal age and fetal gestational age were found in group I. The higher frequencies of congenital anomalies were found in fetuses with NT 3.5-4.4 mm and ≥ 4.5 mm. The most common heart defect anomalies were VSD (13 fetuses); retro-gnathia was found in 13 fetuses and hydronephrosis in 12 fetuses. The 4D ultrasound measurement of NT is of utmost importance in evaluation of increased NT and associated fetal anomalies.^[17]

There are more male fetuses than female fetuses with increased NT, but there are significantly more chromosomal abnormalities among the female fetuses. Female aneuploid fetuses have significantly thicker NT compared with male fetuses. In our study, the pregnancy outcome of euploid fetuses was not related to the gender; further studies are needed about this finding. The long-term outcome of children with increased NT as fetuses is not related to the gender. WHAT'S ALREADY KNOWN ABOUT THIS TOPIC?

- In normal and unselected population, male fetuses have thicker nuchal translucency than female fetuses. WHAT DOS
- Among fetuses with increased nuchal translucency, female fetuses have thicker nuchal translucency than male fetuses.
- There are more chromosomal abnormalities among female fetuses with increased nuchal translucency compared with male fetuses.
- The pregnancy outcome and the long-term outcome of euploid fetuses with increased nuchal translucency are equal for both genders.^[18]

Table 3: Gestational age-related 95th percentile cut-off levels used in Helsinki University Hospital during 2004–2007.

CRL	NT
34–36	1.7
37–39	1.8
40–41	1.9
42–44	2.0
45–47	2.1
48–50	2.2
51–54	2.3
55–58	2.4
59–63	2.5
64–69	2.6
70–80	2.7

CONCLUSION

Variations in nuchal translucency measurement were found. They range between 1.2 to 3.5 any increase more than 3.5 is a sign for chromosomal, heart or abdominal wall defect.

REFERENCES

- Approved by the baby center medical advisory board. www.babycenter.co.uk.
- Parameter developed in conjunction with the American College of Radiology (ACR), the American College of Obstetricians and Gynecologists (ACOG), and the Society of Radiologists in Ultrasound (SRU). AIUM Practice Parameter for the Performance of Obstetric Ultrasound Examinations. 14750 Sweitzer Ln, Suite 100, Laurel, MD 20707-5906 USA, 800-638-5352, 301-498-4100, www.aium.org, ©2013 American Institute of Ultrasound in Medicine.
- Nuchal Translucency Normal Range Chart. New Health Advisor for Daily Health Care. WWW.NEWHEALTHADVISOR.COM © 2014, All rights. Reserved. Last Updated 25 March, 2017.
- Kagan KO, Avgidou K, Molina FS, Gajewska K, Nicolaides KH. Relation between increased fetal nuchal translucency thickness and chromosomal defects. *Obstet Gynecol*, 2006; 107: 6–10. [PubMed]
- Barati M, Zargar M, Masihi S, Taherpour S. Evaluation of nuchal translucency measurement in first trimester pregnancy. *Int J Fertil Steril*, 2011; 5: 35–8. [PMC free article] [PubMed]
- Elahifar MA, Hasanzadeh M, Dahmardeh H, Elahifar A. The relationship between thickness of nuchal translucency and Down syndrome in the first trimester of pregnancy. *Zahedan J Res Med Sci*, 2012; 14: 26–8.
- Tahmasebpour A, Rafiee NB, Ghaffari S, Jamal A. Increased nuchal translucency and pregnancy outcome. *Iran J Public Health*, 2012; 41: 92–7. [PMC free article] [PubMed]
- Salman Guraya S. The associations of nuchal translucency and fetal abnormalities ; significance and implications. *J Clin Diagn Res*, 2013; 7: 936–41. [PMC free article] [PubMed]
- Taipale P, Hiilesmaa V, Salonen R, Ylöstalo P. Increased nuchal translucency as a marker for fetal chromosomal defects. *N Engl J Med*, 1997; 337: 1654–8. [PubMed]
- Hasegawa J, Nakamura M, Hamada S, Matsuoka R, Ichizuka K, Sekizawa A, et al. Distribution of nuchal translucency thickness in Japanese fetuses. *J Obstet Gynaecol Res*, 2013; 39: 766–9. [PubMed]
- Chung JH, Yang JH, Song MJ, Cho JY, Lee YH, Park SY, et al. The distribution of fetal nuchal translucency thickness in normal Korean fetuses. *J Korean Med Sci*, 2004; 19: 32–6. [PMC free article] [PubMed]
- Araujo Júnior E, Pires CR, Martins WP, Nardoza LM, Filho SM. Reference values of nuchal translucency thickness in a Brazilian population sample: Experience from a single center. *J Perinat Med*, 2014; 42: 255–9. [PubMed]
- Kor-Anantakul O, Suntharasaj T, Suwanrath C, Chanprapaph P, Sirichotiyakul S, Ratanasiri T, et al. Distribution of normal nuchal translucency thickness: A multicenter study in Thailand. *Gynecol Obstet Invest*, 2011; 71: 124–8. [PubMed]
- Sun Q, Xu J, Hu SQ, Chen M, Ma RM, Lau TK, et al. Distribution and normal reference range of fetal nuchal translucency thickness in Kunming pregnant women in the first trimester. *Zhonghua Fu Chan Ke Za Zhi*, 2012; 47: 514–7. [PubMed]
- Marzeie Sharifzadeh, Atoosa Adibi, Kimia Kazemi,¹ and Silva Hovsepian² Normal reference range of fetal nuchal translucency thickness in pregnant women in the first trimester, one center study, journal of research in medical sciences, *J Res Med Sci*, 2015 Oct; 20(10): 969–973. doi: 10.4103/1735-1995.172786 PMID: PMC4746871.
- Jennifer M. Walsh Mary E.D' Alton , 45 - Nuchal Translucency, *Obstetric Imaging: Fetal Diagnosis and Care* (Second Edition). 2018, Pages 246-251.e1
- <https://doi.org/10.1016/B978-0-323-44548-1.00045-0> Get rights and content. Moustafa Abdel Kader MD^a Mohamed F. Amin MD^a Ahmed Gotb MD^b., The diagnostic performance of 4D ultrasound in nuchal translucency and anomalies association, *The Egyptian Journal of Radiology and Nuclear Medicine* Volume 47, Issue 4, December 2016, Pages 1701-1708 . doi.org/10.1016/j.ejrn.2016.09.010
- Outi Äyräs¹, Marianne Eronen², Minna Tikkanen¹, Päivi Rahkola-Soisalo¹, Jorma Paavonen¹ and Vedran Stefanovic¹ . The significance of gender in fetuses with increased nuchal translucency: pregnancy outcomes and long-term outcomes of children . the Helsinki University Hospital . Ethical Committee (Dnro 421/E9/07 10 January 2008) . *Prenatal Diagnosis* 2015, 35, 1–5 © 2015 John Wiley & Sons, Ltd.