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Original Research Article

Ultrasonographic Evaluation of Normal Value of Fetal Nuchal Translucency Thickness at 11 To 14 Weeks of Gestation among Pregnant Women of Lahore, Pakistan

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Abstract

First trimester sonographic diagnosis traditionally focused on evaluation of growth by serial examination to differentiate normal from abnormal gestations. Current trends in ultrasound late in the first trimester focus on measuring nuchal translucency thickness combined with maternal age and biochemical tests to determine the risk of chromosomal abnormalities and structural anomalies. The objective of the study was to compare normal reference range of mean fetal nuchal translucency (NT) thickness among pregnant women who were coming to the clinic with international reference values. A cross sectional study was conducted in a private ultrasound clinic, Lahore, Pakistan in one year starting from April 2016 to April 2017, after approval from the Institutional Review Committee of the University. A total of 59 pregnant women at 11-14 weeks gestation, were included in this study after taking consent. All NT measurements were performed by a certified sonographer using the Fetal Medicine Foundation (FMF) recommended protocol. Descriptive statistics were presented in the form of range, mean and standard deviation. The mean maternal age and mean gestational age were (27.9 ± 4.4 years) and (11.8 ± 0.8 weeks) respectively. The mean calculated for nuchal translucency thickness, which ranges from (0.6-2.9 mm), is 1.77 mm. This study results show that normal range of NT thickness coincides with the normal range of mean Nuchal translucency found internationally.

Keywords: Ultrasound; Nuchal translucency; first trimester; fetal neck.

INTRODUCTION

The first ultrasound examination should include a survey scan of the whole of the lower maternal abdomen [1]. First-trimester sonographic diagnosis traditionally focused on evaluation of growth by serial examination to differentiate normal from abnormal gestations [2].

Earlier in the pregnancy, the nuchal region is also the site of a more recently described marker for aneuploidy. This is termed as nuchal translucency and refers to the hypoechoic region along the posterior portion of the fetal neck [3]. Many genetic disorders are now amenable to prenatal diagnosis. Ultrasound plays a central role, not only in the primary diagnosis of fetal structural anomalies, but also in the guidance of amniocentesis and chorionic villous sampling by which genetic material is made available for analysis. In recent years increasing value has been given to the measurement of the fetal nuchal translucency in the first trimester and to a number of other ultrasonographically detected 'soft markers' of chromosome disease [4].

Current trends in ultrasound late in the first trimester focus on measuring the nuchal translucency thickness combined with maternal age and biochemical tests to determine the hazard of chromosomal anomalies and structural anomalies. Associated with the increased emphasis on late-first-trimester ultrasound and first-trimester screening, there is an opportunity to visualize fetal anomalies earlier than at the time of the standard 18 to 20 week scan [5]. Skin thickening in this area is most pronounced at 11 to 13 weeks; a long, thin echogenic line along the back of the fetus (called nuchal translucency) is measured. Thickening of over 3mm is strongly associated with down syndrome [6]. Electronic cursers should be positioned on the inside borders of the lines delineating the lucency so that only the lucent area, and not the specular reflector from the adjacent spine or skin surface, is measured (inner to inner measurement). A nuchal translucency thickness more than 3mm is always considered abnormal from 11 to 14 weeks [7]. Fetal NT thickness usually increases with gestational age [8]. The capacity to accomplish a solid

estimation of NT is reliant on suitable preparing and taking after the standard procedure to accomplish same outcomes among various administrators [9]. Estimation of the nuchal translucency requires cautious consideration regarding procedure [10].

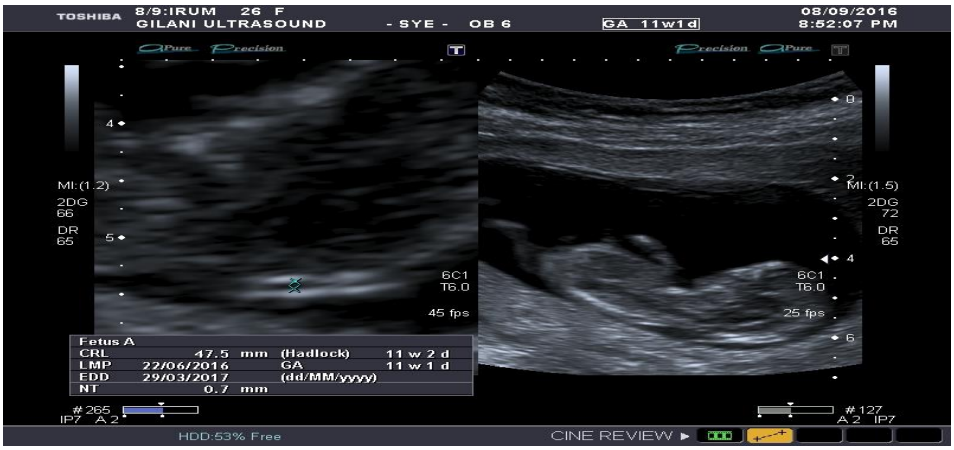

Fig-1: Nuchal Translucency thickness measurement at 11 weeks

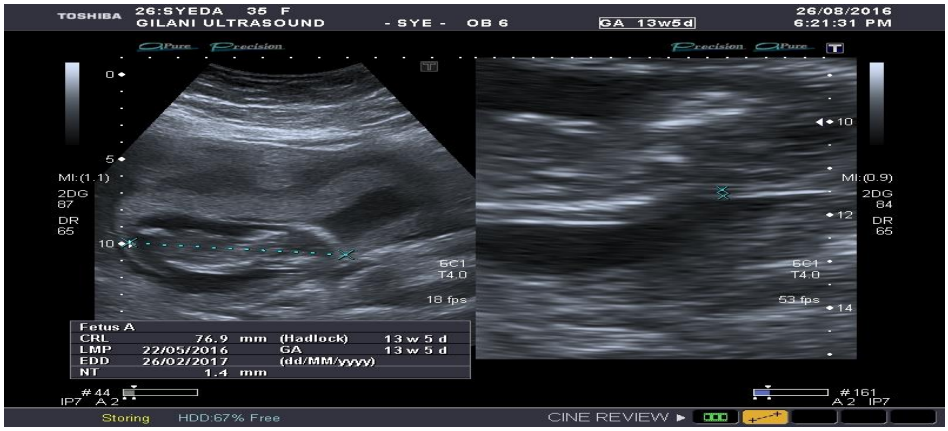

Fig-2: Nuchal Translucency thickness measurement at 13 weeks

Because measurement differences on the order of only tenths of a millimeter determine the difference between a normal and abnormal value, meticulous technique is critical when measuring the nuchal translucency. To decrease the measurement error, the image should be adjusted so that the fetus occupies the majority of the image so that a movement of the cursors produces less than a 0.1mm change in the measurement. The scans can be performed either transabdominally or transvaginally, but care must be taken so that the unfused amnion (which may not completely fuse with the chorion of the normal gestational sac until approximately 16 weeks) is not mistaken for the fetal skin line, potentially leading to overestimation of the nuchal translucency [7]. The measurement of nuchal translucency should be obtained at the level of the neck on a sagittal image of the fetus, rather than in the axial projection used to measure the nuchal fold during the mid-second trimester [11]. The objective of the study was to develop a normal range of nuchal translucency thickness and compare it with the available international values

MATERIAL AND METHOD

It was cross sectional study comprising 59 pregnant women of 11-14 weeks gestation. All pregnant women of 11-14 weeks gestation with normal pregnancy who were coming to private ultrasound clinic were recruited in the study though purposive sampling technique. The study duration was one year, from April 2016 to April 2017. Pregnant women with maternal history of chronic disease such as hypertension, diabetes, evidence of fetal abnormality and abnormal ultrasonographic parameters (intra cardiac hyperechoic foci and absent nasal bone) were not included in the study. The ethical approval to carry out the study was taken from the Institutional Review Board (IRB) of University of Lahore, Pakistan. All the pregnant women were included voluntarily after signing an informed consent form. Standard procedures were followed during this study. The outcome measures on which results were analyzed included variables, i.e. maternal age, gestational age and nuchal translucency thickness.

All scans were performed by transabdominal method. Duplex Ultrasound system with Toshiba-Xario XP, Toshiba-Namio, Honda and Mindray Dc7/Curve Linear Multi-frequency probe 3.5 - 5MHz was used for scanning.

The measurement of nuchal translucency was obtained at the level of the neck on a sagittal image of the fetus. Electronic calipers were positioned on the inner margins of the lines delineating the lucency so that only the lucent area, and not the specular reflector from the adjacent spine or skin surface, is measured (inner to inner measurement). The image was adjusted so that the fetus occupies the majority of the image and so that a movement of the cursors produces less than a 0.1mm change in the measurement.

RESULTS

Data was cleaned and organized before entering in SPSS v.19. Means, percentages and standard deviations (SD) were computed.

Descriptive Analysis

A total of 59 pregnant women with the gestational age 11 to 14 weeks were scanned who were between the ages of 20 to 37 years with mean ±SD 27.9±4.4 years. The mean ±SD for gestational age calculated were 11.8 ±0.8 (Table-1).

Table-1: Mean ± SD of maternal Age and Gestational age (weeks)

Characteristics	N	Minimum	Maximum	Mean	Std. Deviation
Maternal Age	59	20.00	37.00	27.9	4.4
Gestational Age (weeks)	59	11.0	14.0	11.8	0.8

Most of the pregnant women who were coming for the ultrasound scan were between the ages of 20-25 years (Figure-3).

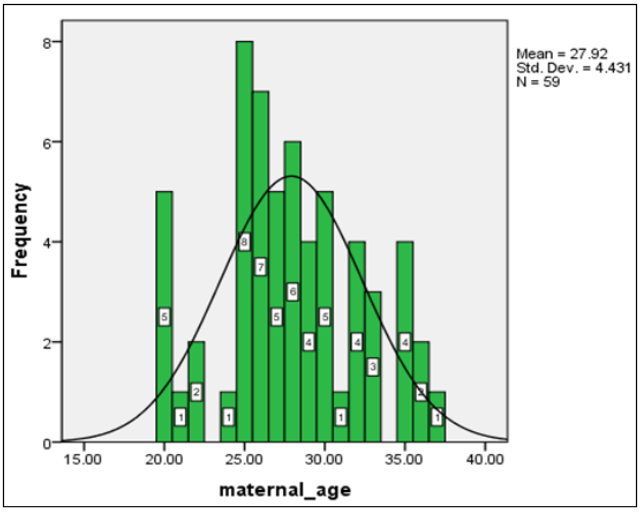

Fig-3: Distribution of pregnant women according to maternal age among the whole sample (N-59)

Among the total sample, 22(38.9%) pregnant women were with gestation age 11 weeks and only one (1.6%) women was with 14 weeks gestational age. The mean ± SD NT thickness is highest in the 14 weeks of gestational age. i.e. 2.30 ± 0.0 (Table-2).

Table-2: Distribution of Mean Nuchal Transluceny thickness among pregnant women with 11-14 week of gestational age (N=59)

G.A (weeks)	Mean ± SD	n	Percentage (%)
11.0	1.66 ± 0.48	23	38.9
12.0	2.02 ± 0.54	22	37.2
13.0	1.50 ± 0.50	13	22.0
14.0	2.30 ± 0.0	1	1.6

The nuchal transluceny thickness was divided into five categories as shown in Table-3. The minimum nuchal thickness noted during scan was 0.6 mm and maximum was 2.9 mm with the combined mean ± SD of 1.77±0.543. Twenty four pregnant women who were scanned had nuchal translucency thickness between 1.6 and 2.0. Only 3 were those who had fetal nuchal translucency thickness greater than 2.5 i.e. between 2.6 and 3.0 mm.

Table-3: Combined mean and distribution of pregnant women according to NT thickness Measurement

Nuchal Translucency Thickness	Number of pregnant women	Mean Nuchal Translucency thickness (Mean±S.D)
0.6-1.0	8	1.77±0.543
1.1-1.5	10	
1.6-2.0	24	
2.1-2.5	14	
2.6-3.0	3	

DISCUSSION

In this study we determined the reference value of NT thickness in sample of Pakistani women coming to a private clinic in Lahore. A total of 59 pregnant women in their first trimester (11-14 weeks) were included in the study. The mean values computed for maternal age and gestational age were 27.9 and 11.8 respectively. The mean nuchal translucency thickness calculated among the whole sample was 1.77 with a range of 0.6 mm minimum and 2.9 mm maximum.

Edward Araujo junior *et al.*, design a prospective cross sectional study to determine nuchal translucency thickness measurement and correlate this measurement to gestational age from 11-14 weeks in sample of Brazilian population, he conclude that in Brazil they needed more study to decided to include the nuchal translucency measurement as ultrasonographic screening tool for chromosomal abnormality in first trimester [12].

Junichi Hasegawa *et al.*, conduct a study to establish the reference value of nuchal translucency thickness in Japanese fetus and he conclude that the nuchal translucency thickness value could be useful in the screening for chromosomal abnormality in the early pregnancy [13].

H. J. JOU *et al.*, conduct a prospective observation study on Taiwanese fetuses with gestational age 9 to 14 weeks and he conclude that nuchal translucency thickness measurement can be a useful screening tool for chromosomal abnormality or other congenital abnormality in the first trimester in Asian population [14].

The total 1790 of normal fetuses was recruited for final analysis. A study was conducted in China on Kunming Chinese pregnant women to develop reference values for nuchal translucency (NT) thickness. A total of 1790 fetuses with no other anomaly were recruited. The mean NT thickness reference value computed is exactly same with the calculated reference value i.e. 1.7 mm reported in our study. This showed that ethnic difference does not exert much effect in the NT thickness interpretations [15].

Some other studies carried out in Nepal, Iran and Korea also reported reference values for NT thickness and mean NT thickness values computed were 1.5 mm, 1.3 mm and 1.6 mm respectively [16, 17, 14]. The differences in means from the studies conducted in Nepal, Iran and Korea, as compared to this study, were 0.2 mm, 0.3 mm and 0.1 mm respectively which again proves that ethnic differences do not play an important role in NT thickness interpretations.

CONCLUSION

The present study tried to establish a normal reference value for the nuchal translucency (NT) thickness among Pakistani women coming to the private clinic. These reference values can be Useful as screening tool for chromosomal abnormality in the first trimester.

RECOMMENDATIONS

We recommended more studies to be conducted for including NT thickness measurements in the 1st trimester screening test to rule out chromosomal abnormality, with increase sample size and duration of study.

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