

# Fetal Nasal Bone Length in the Period of 11 and 15 Weeks of Pregnancy in the Filipino Population

Leodoro J. Labrague<sup>1,\*</sup>, Lynette C. Tan<sup>2</sup>

<sup>1</sup>Samar State University, Philippines

<sup>2</sup>University of Santo Tomas, Manila, Philippines

\*Corresponding author: Leo7\_ci@yahoo.com

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**Abstract** In the recent years, sonographic images of fetal nose have gained popularity in detecting trisomy 21 and other aneuploidies. Reference values for nasal bone length have been reported in different countries and ethnic populations. However, there was no reference range for the fetal nasal bone length (NBL) in the Filipino population. This prospective, cross-sectional study was conducted to establish reference values for the nasal bone length (NBL) at 11 – 15 weeks of gestation in the Filipino population. Ultrasonographic visualization of 74 fetuses at 11th to 15th week gestation was carried out during the months of August 2010 to January 2011. Fetal nasal bone was measured through sagittal section of the fetal profile. Fetal nasal bone length measurement was successfully performed in all 74 cases. The mean nasal bone lengths were 1.97 mm, 2.37 mm, 2.90 mm, 3.49 mm, and 4.05 mm between 11th, 12th, 13th, 14th, and 15th gestational weeks respectively. Nasal bone length increased linearly with advancing gestational age (GA) and crown rump length (CRL). Despite of the limitations posed by this investigation, reference values for the nasal bone length (NBL) at 11 – 15 weeks of gestation in the Filipino population was identified.

**Keywords:** fetal nasal bone, ultrasound, trisomy 21, Down syndrome, First-trimester screening

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## 1. Introduction

Screening for chromosomal abnormalities during the 1980s was initially based only on the pregnant woman's age. In the later years, it has been broadened and included maternal serum alpha-fetoprotein, [1] maternal serum biochemical markers [2], and nuchal translucency thickness measurements. [3] Recently, sonographic images of the fetal nose during the second trimester have gained popularity in accurately predicting the risk of the chromosomal birth defect such as Down syndrome. [4,5].

The fetal nasal bone can be visualized by sonography at 11 to 13+6 weeks of gestation in 99.5% of chromosomally normal fetuses [4]. However, in about 60–70% of fetuses with trisomy 21 and in about 2% of chromosomally normal fetuses the nasal bone is not visible at 11-13 weeks' gestation due to delayed ossification or hypoplasia. [4] Few other studies reported that absence of nasal bone by first trimester ultrasound was significantly associated with Down syndrome. Otano et al [6] reported absence of fetal nasal bone in 60% of fetuses with Down syndrome, while Orlandi et al. [7] observed absence of fetal nasal bone in 67% of fetuses with trisomy 21 and 1% in chromosomally normal fetuses. Prefumo et al [13] also showed a trend of a higher incidence of an absent nasal bone in fetuses of healthy Asian mothers. Moreover, hypoplasia and absence of the nasal bone were also reported in 36% and 2.5% respectively in aborted fetuses.

[8] Furthermore, if combined with other screening methods such as maternal serum free beta-human chorionic gonadotropin (B-hCG), maternal age, fetal nuchal translucency (NT) thickness, and pregnancy-associated plasma protein (PAPP-A) at 11 – 14 weeks, it is projected to increase detection rate to 85% with a false-positive rate of 5% [4].

It is essential to note that nasal bone length measurement is impacted by race and ethnicity. Therefore, racial adjustment is needed in the measurement of fetal nasal bone in screening for trisomy 21 during pregnancy [15].

Reference values for nasal bone length have been reported in different countries and ethnic populations [9,10,11,12,14,18]. However, to the authors' knowledge, no study ascertaining reference ranges for the nasal bone length in a Filipino population have been carried out. Thus, this prospective, cross-sectional study was conducted to establish reference values for the nasal bone length (NBL) at 11 – 15 weeks of gestation in the Filipino population.

### 1.1. Research Objective

This study was conducted to establish reference values for the nasal bone length (NBL) at 11 – 15 weeks of gestation in the Filipino population.

## 2. Methodology



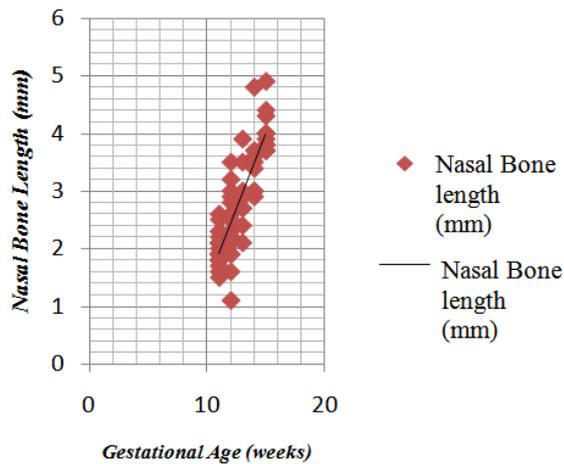


Figure 2. Scatter plot between nasal bone length and gestational age

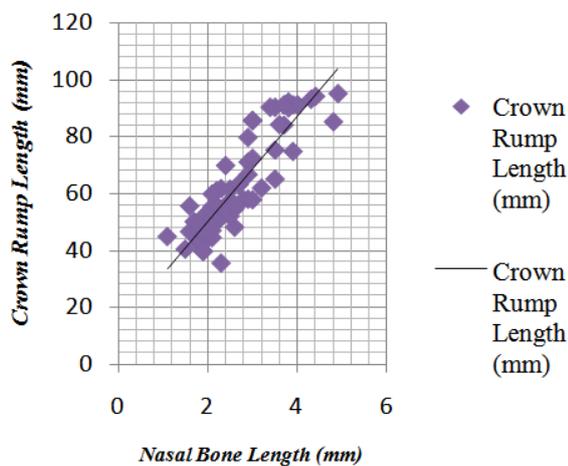


Figure 3. Scatter plot between nasal bone length and crown rump length

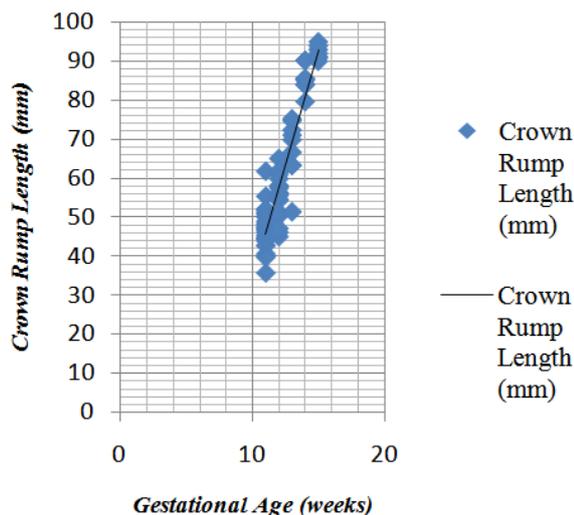


Figure 4. Scatter plot between gestational age and crown rump length

### 4. Discussions

This prospective, cross-sectional study was established reference values for the nasal bone length (NBL) at 11 – 15 weeks of gestation in the Filipino population. Reference values for nasal bone length have been reported

in different countries and ethnic populations. In the current study, the mean nasal bone length ranged from 1.97 mm to 4.05 mm. When compared with other ethnic groups [9,10,12,14], nasal bone length in Filipino population appears to be longer. For instance, in the Korean population, the average nasal bone length were 1.5 mm and 2.1 mm for 11 and 14 weeks gestation [9] The NBLs at the 50th percentile in Latin American population were 1.5, 1.7, and 1.9 mm at 11, 12, and 13 weeks of gestation, respectively. [10] Meanwhile, the nasal bone length in Thai fetuses at 11 to 15 weeks were 1.4 mm (range, 1.1-1.9), 1.7 mm (range, 1.1-2.5), and 2.1 mm (range, 1.5-2.6) at gestational age of 11, 12, and 13 weeks respectively [18]. In the Turkish population, the median values of nasal bone lengths were 1.7 mm, 1.9 mm, and 2.2 mm for 11, 12 and 13 gestational weeks respectively. [12] In the study developed by Cossi et al [14] in a Brazilian population, the nasal bone length in all cases ranged between 1.69 mm and 2.94 mm at 11th and 15th weeks. It can be gleaned further that the average values for nasal bone measurements vary from one study to another. In our study, the mean NBL during the 11th to 15th weeks were relatively higher compared to previous studies undertaken [9,12,14,18]. It is essential to note therefore, based on the previous findings that race and ethnicity have an impact on fetal nasal bone length. In agreement with previous authors [15], maternal ethnicity should be required for utilizing the fetal nasal bone length in the screening for trisomy 21 at the first trimester of gestation. However, other factors such as observer variability and quality of machine used should not be undermined.

It was also evident that the nasal bone length in all cases was increased linearly as pregnancy advances. This result is in keeping with the result obtained by Ceciro et al [4] Cossi et al [14], Moon et al [9], Yayla et al [12], Chen et al. [16], and Cusick et al [17]. Nasal bone length was also highly correlated with CRL. It can be concluded based on this result that as pregnancy progresses, measurements of nasal bone length becomes easier and feasible.

While these data are important as it is the first analysis conducted in the country, nevertheless it has some limitations. First, this investigation was conducted among pregnant women from one province only, thus exclusion of pregnant women from other provinces may limit the generalizability of this investigation. Secondly, the small sample size might have affected the statistical power and effect size of the study. Thus, future studies utilizing bigger samples may be conducted to increase statistical power and effect size.

### 5. Conclusion

Despite of the limitations posed by this investigation, our findings provided reference values for the nasal bone length (NBL) at 11 – 15 weeks of gestation in the Filipino population. Findings also revealed that nasal bone length in the samples vary from other race and ethnic group. In agreement with previous authors, examination of fetal nasal bone at 11 – 15 weeks could have major implications in screening for trisomy 21 by maternal age and fetal nuchal translucency. The findings added

knowledge to the existing body of literature on research related to trisomy 21 screening during pregnancy.

## Competing Interest

The author(s) declare that they have no competing interests.

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