

# The Fetal Nose Bone Nomogram According to Gestational Weeks

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## Abstract

**Objective:** To identify the fetal nasal bone length nomogram in normal pregnancy.

**Methods:** 607 pregnant woman were taken to the study prospectively. The mean ages of the cases were 29.58±5.57 (16-45). A linear relationship were detected between nasal bone length and pregnancy weeks. Nasal Bone =  $-6.8656 + 0.8119 \times \text{GW} + (-0.008723) \times (\text{GW})^2$  was formulated as quadratic regression equations. Between nasal bone and pregnancy weeks a  $r=0.948631$  relationship was detected. This relationship was positively and as the pregnancy week increased, the fetal nasal bone value increases. ( $F=2715.5212$ ;  $P<0.001$ ). The change in nasal bone length is related to pregnancy week as ( $R^2=0.8999$ ). As the weeks of pregnancy progresses, the nasal bone curve's opening was minimally downward. Each week of pregnancy corresponds to a mean and standard deviation of the nasal bone were determined.

**Results:** The fetal nasal bone length measured in 654 pregnant woman who applied to our polyclinic at 11-14. weeks for routine obstetric follow up. Completely normal pregnancies were studied. The fetus that anomaly detected ( $n=32$ ) in ultrasound examination and high risk for karyotype anomalies ( $n=15$ ) were excluded from the study and with 607 women the study had done. The measurements were made on Toshiba 140 A and Voluson 730 Pro ultrasound device by an experienced professional. SPSS.13 ve MEDCALC computer programme were used for the statistical analysis.

**Conclusion:** There was a positive and linear relationship between nasal bone length and gestational weeks. We have developed our center's nomogram and found the ability to compare it with other centers nomogram.

**Keywords:** Nasal bone, nomograms.

## Gebelik haftalarına göre fetal nazal kemik uzunluğu nomogramı

**Amaç:** Normal gebeliklerde fetal burun kemiği uzunluğunun nomogramını belirlemektir.

**Yöntem:** Polikliniğimize obstetrik muayenesi için başvuran 652 gebe kadın, gebeliklerinin 11- 41. haftaları arasında fetal burun kemik uzunlukları ölçüldü. Tamamen normal seyreden gebelikler çalışmaya alındı. Ultrasonda anomali saptanan fetuslar ( $n=32$ ) ve karyotip anomali riski yüksek olan ( $n=15$ ) olgular çalışmadan çıkarıldı ve 607 olgu ile çalışma yapıldı. Ölçümler, deneyimli tek uzman tarafından Toshiba 140A ve GE Voluson 730 Pro cihazları ile yapıldı. İstatistiksel analizlerde SPSS.13 ve MEDCALC bilgisayar programı uygulandı.

**Bulgular:** Çalışmaya prospektif olarak toplam 607 gebe kadın alındı. Gebelerin ortalama yaşı 29.58±5.57 (16-45) bulundu. Burun kemiği uzunluğu ölçümleri ile gebelik haftaları arasında pozitif doğrusal bir ilişki saptandı. Nazal Kemik =  $-6.8656 + 0.8119 \times \text{GH} + (-0.008723) \times (\text{GH})^2$  kuadratik regresyon denklemi şeklinde formülize edildi. Gebelik haftası ile nazal kemik uzunlukları arasında  $r=0.948631$  bir ilişki saptandı. Bu ilişki pozitif yöndedir ve gebelik haftası arttıkça nazal kemik değeri artmaktadır ( $F=2715.5212$ ;  $P<0.001$ ). Nazal kemik uzunluğundaki değişim ( $R^2=0.8999$ ) olacak şekilde gebelik haftasına bağlı olduğu gözlenmiştir. Gebelik haftaları ilerledikçe nazal kemik eğrisi, açıklığı hafif aşağı bakan parabol şeklinde izlendi. Her gebelik haftasına karşılık gelen nazal kemik ortalamaları ve standart sapma değerleri belirlendi.

**Sonuç:** Nazal kemik uzunluğu ile gebelik haftaları arasında pozitif doğrusal bir ilişki saptandı. Kendi merkezimizin nomogramını çıkararak diğer merkezlerin çalışmaları ile karşılaştırma olanağını bulduk.

**Anahtar Sözcükler:** Nazal kemik, nomogram.

## Introduction

The nasal bone can be visualised after the tenth week of pregnancy by ultrasound examination. Whenever not measured in the appropriate plan can it causes misinterpretation. The quality of the ultrasound device, oligohydramnios, obesity, the position of the fetus and the quality of the image can be affect the success result. In recent years, the measurement of nasal bone, has been a parameter in the sonographic evaluation of chromosome abnormalities. The risk of karyotype anomaly is increasing, when nasal bone is aplasic in the first trimester, aplasic or hipoplastic in the second and third trimester.<sup>1</sup> The lenght of the nasal bone has been suggested to vary between the races. In the choromosome anomalies, especially in the Down syndrome, the development of the nasal bone can be slow and smaller. Many measurements nomograms are being used in chromosome anomalies. In recent years, nasal bone measurement began to be used. We aimed to compose our nomogram and datas of nasal bone lenght of our population in this study.

## Methods

The fetal nasal bone lenght measured in 652 pregnant woman who applied to our policlinic at 11-14. weeks for routine obstetric follow up. In some women the fetal lenght were measured again during the follow up. The fetusus that anomaly detected (n=32) in ultrasound examination and high risk for karyotype anomalies (n=15) were excluded from the study and with 607 women the study had done. Completely normal pregnancies were studied. The measurements were made on Toshiba 140 A and Voluson 730 Pro ultrasound device by an experienced Professional in Perinatology. Mostly, by using transabdominal ultrasound, in the mid-sagittal

**Table 1.** The mean, min, max and SD values of nasal bone according to GW.

GH	n=607	Mean	Min	Max	SD
11	3	1.30	1.2	1.4	0.10
12	25	1.58	1.22	1.94	0.36
13	21	1.85	1.55	2.15	0.30
14	11	2.22	1.74	2.66	0.44
15	13	3.31	2.69	3.93	0.62
16	38	4.14	3.54	4.74	0.60
17	70	4.59	4.09	5.09	0.50
18	68	5.00	4.48	5.52	0.52
19	40	5.37	4.52	6.37	0.85
20	23	5.86	4.12	6.60	0.74
21	33	6.41	5.68	7.14	0.73
22	30	6.63	5.48	7.78	1.15
23	19	7.01	6.09	7.93	0.92
24	17	7.36	6.52	8.40	0.84
25	27	7.48	6.85	8.11	0.63
26	16	8.13	6.94	10.32	1.19
27	17	9.21	8.31	10.11	0.90
28	16	9.00	8.13	9.87	0.87
29	15	9.46	8.35	10.57	1.11
30	15	10.02	9.46	11.40	1.38
31	15	10.10	8.87	11.33	1.23
32	12	10.17	9.72	12.62	1.45
33	14	10.59	9.21	12.79	1.38
34	13	10.49	9.39	11.59	1.10
35	12	10.27	9.25	11.29	1.02
36	6	10.81	10.28	11.34	0.53
37	8	11.28	9.86	13.70	1.42
38	7	11.65	9.06	14.24	2.59
39	2	13.10	12.86	13.24	0.14
40	1	10.80			-

face profile, the lateral view of nasal bone was played, and the limit of the frontal bone and nasal bone detected and nasal bone measured in the end of the nasal bone position. One or more the most accurate measurements were accepted. SPSS.13 ve MEDCALC computer programme were used for the statistical analysis.

## Results

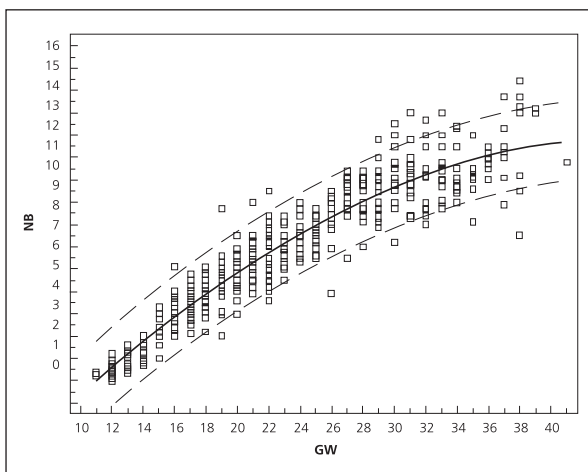
607 pregnant woman were taken to the study prospectively. The mean ages of the cases were  $29.58 \pm 5.57$  (16-45). A linear relationship were

detected between nasal bone length and pregnancy weeks. Nasal Bone =  $-6.8656 + 0.8119 \cdot \text{GW} + (-0.008723) \cdot (\text{GW})^2$  was formulated as quadratic regression equations. This relationship is positively and as the pregnancy week increased, the fetal nasal bone value increases ( $F=2715.5212$ ;  $p<0.001$ ). The change in nasal bone length is related to pregnancy week as  $R^2=0.8999$  and this relationship was positive. As the weeks of pregnancy progresses, the nasal bone curve's opening was minimally downward (Graphic 1). Each week of pregnancy corresponds to a mean and standard deviation of the nasal bone were determined (Graphic 2).

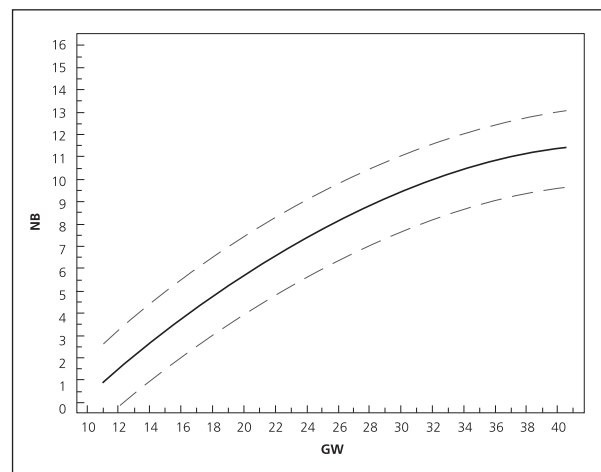
## Discussion

The ossification points of the nose begins to develop from the gristle focus on the middle part after the 10 th week of pregnancy. The vomer bones previously seen like U shaped, then through the advanced weeks takes V shape by receive combined. In this period of review the gap between the bones can be accidentally considered as absence of the bone. In 1866 Langdon Down noted that a common

characteristic of patients with trisomy 21 is a small nose.<sup>9</sup> Yayla et al., reported that work weeks of gestation in the nasal bone and while a linear curve, in our study of the nasal bone length with weeks of gestation showing an improvement with pregnancy in the last week of the nasal bone length has shown a slow-down. Gianferrari et al reported that absence of a nasal bone is a useful marker for Down syndrome, allowing for the identification of nearly half of all affected pregnancies with a very low false-positive rate.<sup>10</sup> On ultrasound examination the nasal bone should be measured in neutral position and with an angel of nearly 45 degree. The quality of the ultrasound device is an important factor. The high resolution of the device reduces the error rate. The important parameters that roles on a right measurement are, the quality of the device, the experience of the doctor and causes related to mother and fetus. A good resolution 2D device is sufficient for the measurement. The differences between race or ethnicity should not be ignored. The nasal bone should not be visualized between 11-14 weeks of pregnancy in 0.5-1 % although it is normal, especially this ratio is higher in black



**Graphic 1.** The change of nasal bone mean and SD curve according to gestational week.



**Graphic 2.** The mean of nasal bone and the change and the data of the SD curve according to gestational week.

race. Sivri et al.,<sup>11</sup> reported that fetal nasal bone length increases by the growing of the fetus. Earliest in 10 weeks of gestation, when the CRL of 42 mm and nasal bone length was 0.8 mm can be measured. The nasal bone was measured as  $1.3 \pm 0.10$  mm in the 11 the pregnancy week as earliest. In many recent studies, a positive linear increase have been showed between nasal bone length and pregnancy weeks. Similar results has been found in our study. In the first half of pregnancy while it showed a linear increase, this increase has slowed and drawn a parabola which opening was downward in the second half of pregnancy. In the trisomy cases the ossification of the nasal bones are delayed. Larose et al., reported that the nasal bone has not been visualised in Down syndrome cases with a rate of 52% in 11-14 th week of pregnancy and 43% 14-25 weeks. Cicero et al., reported the nasal bone as hypoplastic (<2.5 mm) in trisomy 21 cases with 61.8 % and normal fetus 1.2 % in the 15-22 weeks of pregnancy. From this point, presence of nasal bone hypoplasia is related with approximately 50-fold increased risk trisomy 21.

## Conclusion

As a result, the fetal bone can be measured from the 11 th week of the pregnancy up to term pregnancy. The risk of trisomies is increasing, in the presence of aplasia or hypoplasia of nasal bone. We found opportunity of comparison our nomogram with other centers nomogram. We think that it is more proper that to compare our measurements with our nomogram and for absolute results we need an increase in the number of the patients.

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