Objectives
The aim of this study was to evaluate the repeatability of ultrasonographic measurement for these fetal facial markers, such as inferior facial angle (IFA), maxilla-nasion-mandibular angle (MNM), mandibulo-maxillary line (MML), frontal space (FS) distance, to analyze the correlation between these markers and fetal crown-rump length (CRL), and to provide normal reference range for these markers during first trimester.

Methods
Three hundred and ten stored 2D (two dimensional) ultrasonographic images were retrospectively selected and the markers were measured by ViewPoint 6 software, by two experienced sonographers. The images were obtained for the purpose of fetal NT measurement. Intra-operator and inter-operator repeatability was determined by using 95% limits of agreement (95% LOA). The distribution and variation trend of the parameters were analyzed and calculated.

Results
The parameters were measured in the images of 303 normal fetuses. For each parameter, the repeatability for intra-operator and inter-operator was good. IFA value ranged from 38.44° to 127.29°, with the mean (standard deviation) value of 83.73 (14.95)°. The reference range for IFA was 54.43°~113.03°. Consequently, micrognathia should be suspected with an IFA value below 54.43°. The correlation between IFA value and CRL had a borderline statistical significance (p=0.056). The MNM angle had no significant correlation to CRL(p=0.44), with the mean (SD) value of 4.58 (2.33)°. The reference range was 1.17°~9.66°. The mean FS distance was 2.73mm (SD 1.57). FS distance was dependent on CRL (FS=6.25-0.054*CRL, r=-0.256, p<0.001).

Conclusions
During first trimester it is reliable to measure these markers by prenatal ultrasonography, such as IFA, MNM angle, FS distance, which represent fetal facial profile especially the relative position of maxilla and mandibular. The reference range of these markers are preliminarily constructed, which provide quantitative reference for the further diagnosis of fetal cleft lip and palate, micrognathia.