

## Deuteromelayu Race Characteristic on Class III Malocclusion with Mandibular Prognathism

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### Abstract

Skeletal class III with mandibular prognathism is a condition in which the mandible is advanced anteriorly involving the teeth and jawbone, resulting in occlusion deviation. This disorder varies by race.

97 samples were obtained from the Oral Surgery department of Hasan Sadikin Hospital, Padjadjaran University Dental Hospital, and dental clinics in Bandung, Jakarta, and Semarang, separated into two groups, namely the case group III Skeletal with Mandibular Prognathism and the control group based on inclusion and exclusion criteria. Then a cephalometric examination was carried out to obtain the values of SNA, SNB, ANB, ramus height, corpus length, gonion angle, BUI classification, OP-SN angle, and SN-MP angle.

47 samples with an average SNA score of 860 and an SNB score of 91.50 were included in the case group. The case group averaged a ramus length of 5.43 cm, a corpus length of 8.74 cm, and a gonion angle of 130.10. The MP-SN angle is  $270^\circ$ , the OP-SN angle is  $140^\circ$ , and the average includes clusters 4 and 5 of the BUI classification.

The MP-SN angle is formed between the mandibular plane line and the cranial base, averaging  $230^\circ$ - $370^\circ$ . The development of the face in the vertical direction is related to the growth pattern of the maxilla and mandible. In the sample group of class III prognathic mandibles, it was found that the number of samples that had an SN-MP angle greater than  $270^\circ$  was 25 samples or 62.5%. The OP-SN angle value between the lines SN (cranial base) and OP (occlusal plane) has a standard value of  $140^\circ$ ; if the value is greater than the standard value, it indicates that the individual has excessive vertical growth whereas if the value is smaller than the average value, the title suggests an individual with excessive horizontal growth.<sup>6</sup> The sample group of corner cases is smaller than  $140^\circ$ , totalling 33 samples or 82.5%. The BUI classification shows clusters 4 and 5 do not belong to the long face category.

Skeletal class III samples with the Deutero-Malay race's mandibular prognathism show shorter than long faces.

Clinical article (J Int Dent Med Res 2023; 16(3): 1177-1180)

**Keywords:** Mandibular prognathism, race, characteristic.

**Received date:** 11 June 2023

**Accept date:** 21 July 2023

### Introduction

Angle defines class III malocclusion in which the maxillary first molar mesiobuccal cusp is occluded between the mandibular first and second molar. This occlusion is commonly found in mandibular prognathism, in which the mandible advance anteriorly.<sup>1</sup> Many factors, such as genetic, epigenetic, and environmental factors,

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affect this. Genetic factors play a prominent role in the development of mandibular prognathism; therefore, the incidence also varied between territories (1-10%), with the lowest in India and the highest in the People's Republic of China and Malaysia, with 15,96% and 16.59%, respectively.<sup>2-4</sup>

The relationship between genetic and environmental factors is correlated strongly; considerable research shows that genetic factors, such as the Habsburg family case. Environmental factors play a role during mandibular development by affecting a person's health in several conditions, such as tonsil enlargement, respiratory obstruction, a congenital anatomical defect, pituitary gland disease, hormonal disturbance, bad habits, and trauma.<sup>5,6,7,8</sup>

Research shows various factors affecting the mandible morphology and facial characteristics in Japan, The Republic of Korea, Turkey, Iran, and the Peoples's Republic of China.<sup>9,10</sup> This study aims to analyze deuteromelayu race characteristics on class III malocclusion with mandibular prognathism.

### Materials and methods

#### Study population

Samples are collected for two groups, treatment and control. The treatment group includes a subject with class III malocclusion accompanied by mandibular prognathism based on cephalometric, deuteromelayu race, does not have systemic disease, never received maxillofacial trauma, and agrees to the informed consent. The sample criteria for the controlled group were normal skeletal relation, no family history with class skeletal, deuteromelayu race, no disease that affects growth, and participation agreement. The craniofacial condition of each subject is verified using cephalometric radiography and analyzed using OneCeph digital cephalometric.

#### Cephalometric analysis

We take a Cephalometric radiograph from the sample that fulfils the inclusion criteria and then analyze the radiograph using Oneceph software (Google Play Store, Google Inc, Mountain View, Calif). After calibration of the images based on the calibration scale, skeletal and dental landmarks for Steiner's analysis were identified by the same operator on digital images

using a stylus. After completion of landmark plotting, linear and angular measurements of Steiner's analysis were obtained from the OneCeph application. The examination was conducted to obtain the SNA, SNB, ANB, ramus height, corpus length, gonion angle, BUI classification, OP-SN angle, and SN-MP angle.

#### Statistical analysis

The chi-square analysis evaluated the differences between the ANB angle degree with class III malocclusion and mandibular prognathism with the controlled group. The data were evaluated using SPSS software ((SPSS Inc., Chicago, IL, USA)

### Results

#### Sample characteristic

The sample that fulfilled the inclusion criteria was 97, with 40 cases and 57 control. Based on recapitulation, there were 53 male subjects and 51 female subjects.

#### Cephalometric Analysis Result

	Ramus Height (cm)	Corpus Length (cm)	Gonion Angle
Mean	5,43	8,74	130,10
Deviasi Standard	1,17	1,43	8,46
Median	5,45	8,65	130,00
Minimum	3,30	5,58	115,00
Maximum	7,40	11,40	150,00

**Table 1.** Ramus Height Calculation.

The MP-SN value shows that based on these parameters, the sample group of class III mandibular prognathism with SNPs Rs6180 AC CC obtained the number of samples that had an SN-MP angle greater than 270 as many as 25 samples or 62.5%, SN-MP angle 270 -370 by 20 samples or 30% and the SN-MP angle is more significant than 370 by three samples or only 7.5%.

Angle	Total	Percentage
270>	25	62,5
270-370	12	30
370<	3	7,5
<b>TOTAL</b>	<b>40</b>	<b>100</b>

**Figure 1.** OP-SN Angle Value with Angle 270> Hypodivergent, 270-370 Normodivergent, 370<Hyperdivergent.

The value of the OP-SN angle between the SN (cranial base) and OP (occlusal plane) lines with an average value of 140; if the value is greater than the average value indicates that the individual has excessive vertical growth, whereas if the value is smaller than the standard value it suggests an individual with excess growth in the horizontal direction. 6 The SNPs rs6180 AC CC case group with an angle greater than 140 total seven samples or 17.5%, and an angle smaller than 140 totalled 33 samples or 82.5 %

Normal Value	Total	Percentage (%)
14 <sup>0</sup> <	7	17,5
14 <sup>0</sup> >	33	82,5
<b>total</b>	<b>40</b>	<b>100</b>

**Figure 2.** OP-SN Angle Value with a Normal Value of 140.

### Discussion

Skeletal Class III, malocclusion with mandibular prognathism, is the relationship of the mandible to the maxilla and cranial base with the characteristic mandible anteriorly with the prognathic mandible.<sup>2</sup> The growth and development of the mandible are determined by genetic factors, although environmental factors.<sup>11</sup> Class III skeletal malocclusion is an abnormality characterized by a combination of dental occlusion and jaw relation which clinically shows a prognathic mandible; this is due to a prognathic mandible or hypoplastic/retrognathic maxilla or a combination of the retrognathic maxilla and prognathic mandible. The skeletal class III phenotype varies by sex and race. The highest prevalence was in East Asian populations such as Korea, China, and Japan.<sup>12</sup>

The facial plane or facial plane generally describes the different degrees of facial profile to determine the direction of facial growth and development. The MP-SN angle is formed between the mandibular plane line and the cranial base, averaging 230-370. Vertical facial development is related to maxillary and mandibular growth patterns. Examination using a head cephalogram revealed three groups of different facial planes: hypo-divergent (SN-MP less than 270), normodivergent (SN-MP 230-370), and hyper divergent (SN-MP greater than 370).<sup>13</sup>  
<sup>14,15</sup> The MP-SN value shows that based on

these parameters, the sample group of class III prognathic mandibles obtained the number of samples that had an SN-MP angle greater than 270 as many as 25 samples or 62.5%, the SN-MP angle is 270-370 in 20 samples or 30% and the SN-MP angle is more significant than 370 in 3 samples or only 7.5%.

The OP-SN angle value between the SN (cranial base) and OP (occlusal plane) lines with a standard value of 140; if the value is greater than the standard value indicates that the individual has excessive vertical growth, whereas if the value is smaller than the standard value it suggests an individual with excess growth in the horizontal direction.<sup>13</sup> The SNPs rs6180 AC CC case group with an angle greater than 140 total seven samples or 17.5%, and an angle smaller than 140 totalled 33 samples or 82.5%. So it was concluded that there were more short faces than long ones for skeletal class III samples with prognathic mandibles.

Class III skeletal malocclusion is an abnormality characterized by a combination of dental occlusion and jaw relation which clinically shows a prognathic mandible; this is due to a prognathic mandible or hypoplastic/retrognathic maxilla or a combination of the retrognathic maxilla and prognathic mandible. The skeletal class III phenotype varies by sex and race. The highest prevalence is in East Asian populations such as Korea, China, and Japan.

### Conclusions

The cephalometric analysis in this research shows that skeletal class III samples with the Deutero-Malay race's mandibular prognathism show shorter than long faces.

### Declaration of Interest

The authors report no conflict of interest.

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