ORIGINAL RESEARCH ARTICLE

Lateral cephalometric values of FKG ULM students Banjar ethnic according to Steiner analysis

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ABSTRACT

Objectives: This study aimed to determine the value of dentocraniofacial measurements of FKG ULM students from Banjar ethnic in terms of lateral cephalometric radiography using Steiner analysis.

Materials and Methods: Cephalometric measurements were performed using the Steiner analysis method on skeletal landmarks: SNA, SNB and ANB; dental: UI-NA, LI-NB, and interincisal angle. Data analysis was performed by descriptive statistical method.

Results: The average skeletal and dental value of the FKG ULM students from Banjar ethnic at the

SNA angle is 86.31°± 4.49°, the SNB is 81.33°± 4.39°, the ANB is 4.98°± 2.05°, the UI-NA angle is 19.69°± 8.22°, the LI-NB angle is 28.65°± 6.76°, the UI-NA distance is 4.45± 2.86 mm, the LI-NB distance is 8.58± 3.19 mm and the interincisal angle is 126.43°± 10.51°.

Conclusion: The dental and skeletal averages showed that the FKG ULM students from Banjar ethnic had more prognathic maxillary and mandibular positions and more protrusive maxillary and mandibular incisor positions than the normal standard of Steiner's analysis.

INTRODUCTION

Indonesia is one of the largest archipelagic countries in the world which consists of many races and ethnic groups. Most of the Indonesian population comes from the Mongoloid race which is then divided into 2 sub-races, namely the Proto and Deutro Malay races. The Banjar ethnic is the result of acculturation of the Proto and Deutro Malay races.[1–5] Each racial or ethnic group has its own distinct characteristics, one of which is physical characteristics which include the dentocraniofacial pattern.[3,7,9,10] Identification of the physical characteristics of the dentocraniofacial pattern is necessarily performed to obtain information that can be useful in the field of dentistry in particular to establish a diagnosis and plan appropriate orthodontic treatment.[9–14] Identification of dentocraniofacial patterns can be done by performing lateral cephalometric analysis and measurements.[11–14]

Cephalometry is the analysis of quantitative measurements in the form of angular or linear measurements of the anatomical structure of the head radiographically to obtain craniofacial pattern values based on reference points (landmarks).[3,9,12,13] Cephalometric radiography is divided into frontal and lateral cephalometry. The field of dentistry, especially orthodontics in general, uses lateral cephalometry more often as one of the supporting examinations that can help establish a

diagnosis and determine orthodontic treatment plans.[3,11–13] The analytical method that is often used in cephalometric analysis and measurement is the Steiner analysis method. It is easy to perform and can be used to identify dentocraniofacial variations including the position and inclination of the incisors to the jaw, the relation of the maxilla and mandible to the cranial base, and soft tissue profiles which are divided into dental, skeletal, and soft tissue analysis. This study aimed to determine the dentrocraniofacial pattern through the values of dental and skeletal measurements in FKG ULM students from the Banjar ethnic in terms of lateral cephalometric measurements using Steiner analysis.

MATERIALS AND METHODS

This research is descriptive research conducted with a cross-sectional method. The sample of this study was taken using the purposive sampling method with the criteria of FKG ULM students from the original Banjar ethnic from two previous descendants (father, mother, grandfather, and grandmother) aged 18 years and over and having an occlusion relation of first class I molars according to Angle, totaling 45 people (16 males and 29 females). Lateral cephalometric examination was

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carried out at Gusti Hasan Aman Hospital, Banjarmasin. The tools and materials used in this study were cephalograms in digital format, WebCeph tracing and cephalometric analysis software, computer equipment, questionnaire sheets, informed consent sheets, and explanation sheets for research subjects.

Lateral cephalometric x-rays were taken on the research subjects, then dental and skeletal cephalometric analysis and measurements were performed using a digital method based on landmarks Steiner analysis on the cephalogram using WebCeph cephalometric tracing and analysis software. Measurements were made on 6 cephalometric landmarks of Steiner's analysis, namely SNA, SNB, ANB, UI-NA, LI-NB and interincisal angle. Angular measurements were performed on the SNA, SNB, ANB, UI-NA, LI-NB angle landmarks and the interincisal angles were recorded on an ordinal scale and degrees. Linear measurements were made on landmarks UI-NA and LI-NB distances recorded in ordinal and millimeter scales. The analysis was carried out using descriptive statistical techniques using the Statistical Package for the Social Sciences (SPSS) software to present the mean and standard deviation of the measurement results.

RESULTS

The number of samples in this study was 45 samples consisting of 16 males and 29 females who had met the inclusion and exclusion criteria (Table 1). The age range of the research sample is 18-22 years. Cephalometric analysis and measurements were carried out on 6 landmarks of Steiner's analysis, SNA, SNB, ANB, UI-NA, LI-NB, and interincisal angle using tracing software and

WebCeph analysis. Skeletal value measurements were performed on SNA, SNB, and ANB angle landmarks. Measurement of dental values was performed on landmarks, UI-NA angle, UI-NA distance, LI-NB angle, LI-NB distance, and interincisal angle.

Based on Table 2, the results of skeletal value measurements showed that the average SNA angle value has an angle value difference of 4.31° which is greater than the normal value of Steiner's analysis, it shows that on average, the Banjarese FKG ULM students have a more prognathic maxillary position than the standard value. The results of the measurement of the average value of the SNB angle show a difference in the value of 1.33° which is greater than the normal value of Steiner's analysis. The average value of the ANB angle in this study has a difference in the value of 2.98° which is greater than the normal value of Steiner's analysis, it shows that the average Banjarese FKG ULM students have skeletal class II relationships.

The results of lateral cephalometric measurements of all research samples in Table 3 show the average value of the UI-NA dental angle measurement has a difference in the value of 2.31° which is smaller than the normal value of Steiner's analysis, it shows that the average value of the FKG ULM students is ethnic Banjar has a maxillary incisor inclination that is more retroclined than the normal standard Steiner analysis. The value of the LI-NB angle has a difference in the value of 3.65° which is greater than the normal value of Steiner's analysis, it shows that on average the students of FKG ULM Banjar ethnic have a mandibular incisor inclination that is more proclination than the normal standard of Steiner's analysis. The results of the UI-NA distance measurement have a difference in the value of 0.45 mm which is greater than the normal value of Steiner's analysis, the LI-NB

Table 1. Number of Samples based on Gender

Gender	Amount
Male	16
Female	29

Table 2. Results of Descriptive Statistical Analysis of Skeletal Measurement Values FKG ULM Students from Banjar Ethnic Using Steiner Analysis

Variable	FKG ULM Students from Banjar Ethnic, n=45		
	Mean	SD	95% CI
SNA (°)	86.31	4.49	84.96- 87.66
SNB (°)	81.33	4.39	80.01- 82.66
ANB (°)	4.98	2.05	4.36- 5.60

Table 3. Results of Descriptive Statistical Analysis of Dental Measurement Values FKG ULM Students from Banjar Ethnic Using Steiner Analysis

Variable	FKG ULM Students from Banjar Ethnic, n=45		
	Mean	SD	95% CI
UI-NA (°)	19.69	8.22	17.22- 22.16
LI-NB (°)	28.65	6.76	26.62- 30.69
UI-NA (mm)	4.45	2.86	3.59- 5.31
LI-NB (mm)	8.58	3.19	7.62- 9.54
Interincisal Angle	126.43	10.51	123.27- 129.59

distance has a difference of the value of 4.58 mm which is greater than the normal value of Steiner's analysis and the average value of the interincisal angle of the students of FKG ULM Banjar ethnic. has an interincisal angle value that is smaller than the normal value of Steiner's analysis with a difference in angle value of 4.57°, this indicates that on average, the Banjarese FKG ULM students have maxillary and mandibular incisor positions that are more protrusive than the normal standard of Steiner's analysis.

DISCUSSION

Based on the results of the study, the measurement of skeletal values of FKG ULM students from the Banjar ethnic at the SNA angle showed a mean or average value of 86.31°± 4.49°, SNB angle of 81.33°± 4.39°, ANB angle of 4.98°± 2.05°. The mean or average value of dental measurements of FKG ULM students from Banjar ethnic at the UI-NA angle is 19.69°± 8.22°, the LI-NB angle is 28.65° ±6.76°, the UI-NA distance is 4.45± 2.86 mm, the LI-NB distance of 8.58± 3.19 mm and the interincisal angle of 126.43°± 10.51°.

Steiner stated that the SNA angle value that was greater than the normal value indicated a prognathic maxillary position to the cranial base, while the SNA angle value that was smaller than the normal value indicated a retrognathic maxillary position to the cranium base. This study shows that on average, the Banjarese FKG ULM students have a maxillary position that is more prognathic than the normal standard of Steiner's analysis. The results of this study show similarities with the results of research by Mimi et al and Mohammad et al which stated that the Batak ethnicity (Proto-Malay race), Jawa ethnicity (Deutro-Malay race) and the Malaysian Malay population have a maxillary position that is more prognathic than the normal standard of Steiner's analysis.[6,29] The tendency of maxillary prognation can be caused by various factors. which includes the length of the cranial base, the anteroposterior position of the jaw and the rotation of the jaw in the occlusal plane.

Steiner stated that the SNB angle value that was greater than the normal value indicated a prognathic position of the mandible to the cranial base, while the SNB angle value that was smaller than the normal value indicated a retrognathic mandibular position to the cranium base.[3,11–13,17] The mean value Measurement of the SNB angle in this study showed that FKG ULM students from the Banjar ethnic had a more prognathic mandibular position than the normal standard Steiner analysis. The results of the measurement of the SNB angle in this study have similarities with the results of the study of Mimi et al and Mohammad et al. which stated that the measurement of the SNB angle in the Proto-Malay race, Deutro-Malay race and the Malaysian Malay population showed a value greater than the normal standard of Steiner analysis.[6,29] The results of this study are also following the results of Munandar's study stated

that the average mandibular growth pattern in the Indonesian population tends to be more prognathic than other population groups such as the Caucasoid race, this is because the Indonesian population has a growth pattern of the mandibular ramus that is more vertical.

This study shows that the average study sample has a class II skeletal relation tendency, this is because the results of the measurement of the average ANB angle value of the study sample indicate that the ANB angle value is greater than the standard normal value of Steiner's analysis and shows that the average FKG ULM student from Banjar ethnic has a prognathic maxillary position. Steiner stated that the greater the value of the ANB angle, the greater the difference in the position of the maxilla and mandible.[29]

The measurement of dental values on the UI-NA landmark cephalometry that was read angularly showed the inclination of the maxillary incisors, while those that were read linearly indicated the position of the maxillary incisors concerning the NA plane. LI-NB landmarks read in degrees of angle indicates the inclination of the mandibular incisors, while those read in millimeters indicate the position of the maxillary incisors relative to the NB plane. The interincisal angle shows the relationship between the maxillary and mandibular incisors based on their inclination.[3,13,17,19] Steiner stated that the normal value of dental measurements at the UI-NA angle landmarks was 22°± 4°, the LI-NB angle was 25°± 4°, the distance between UI-NA and LI-NB are 4 mm and the interincisal angle is 131°.[3,11,12,14,29]

Steiner in his research revealed that if the UI-NA value read angularly (angle) had a value greater than the normal value, it indicated the proclination position of the maxillary central incisor. The UI-NA value which is read linearly if it has a value greater than the normal value indicates a protrusive position of the maxillary incisors.[3,12,13] The average UI-NA angle value in FKG ULM students from the Banjar ethnic indicates the position of the maxillary incisors that are retroclined from the normal standard Steiner analysis.

Steiner stated that if the LI-NB value read angularly has a value greater than the normal value, it indicates the proclination position of the mandibular central incisor. The LI-NB value which is read linearly (mm) if it has a value greater than the normal value indicates a protrusive mandibular incisor position.[3,13,17,19] The results of measuring the LI-NB angle and LI-NB distance in this study indicate that The position of the mandibular incisors of FKG ULM students from Banjar ethnic tends to be more proclination and protrusive or labioversion than the normal standard of Steiner analysis. The results of this study have similarities with the results of Mimi et al study which showed that the inclination and position of the mandibular incisors in the Batak ethnic (Proto-Malay race) were more proclination and protrusive than the normal standard of Steiner's analysis.[6,29]

The average value of the measurement of the interincisal angle in the sample of this study shows the relationship between the maxillary and

mandibular incisors which tends to proclination (bimaxillary proclination) from the normal standard Steiner analysis. The tendency of proclination of the maxillary and mandibular incisors in the average study population does not require correction or orthodontic treatment from an aesthetic and functional aspect, because the average value of the interincisal angle in the study population shows a number that is close to the normal value and does not show a significant difference in value from the standard Steiner analysis normal values. Steiner stated that the Mongoloid race tends to have a smaller interincisal angle value than the Caucasoid race.[9,21] The results of the study are following the results of Steiner's study, because the Banjar ethnic is the result of acculturation of the Proto-Malay and Deutro-Malay races which are sub-races of the Mongoloid race.[1,3–5] The results of this study are following with the results of Munandar's study which stated that the Indonesian population tends proclination and protrusive maxillary and mandibular incisors, this is because genetically the Indonesian population has a procumbent dentoalveolar structure.[6,21,29]

CONCLUSION

The mean value of lateral cephalometric measurements in FKG ULM students from Banjar ethnic showed a skeletal class II tendency, maxillary incisor retroclination, proclination of mandibular incisors and protrusive mandibular incisors from the normal standard Steiner analysis.

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FOOTNOTES

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