



## Analysis of Morphometric Variations in the Thickness of the Mandibular Symphysis in Patients at Dr. Mohammad Hoesin General Hospital Palembang, Indonesia

Mufida Muzakkie<sup>1\*</sup>, Muhammad Fikri Aulia<sup>2</sup>, S.N.A. Ratna Sari Devi<sup>3</sup>, Ziske Maritska<sup>4</sup>

<sup>1</sup>Department of Plastic, Aesthetic and Reconstructive Surgery, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia

<sup>2</sup>Specialized Residency Training, Department of Surgery, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia

<sup>3</sup>Department of Radiology, Dr. Mohammad Hoesin General Hospital, Palembang, Indonesia

<sup>4</sup>Departement of Medical Biology, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia

### ARTICLE INFO

Received: December 7, 2023;

Accepted: February 14, 2024;

Published: April 1, 2024.

#### Keywords:

Champy's technique

Fracture

Gender

Mandibula

Symphysis

\*Corresponding author: Mufida Muzakkie

E-mail address: [mufida.muzakkie@gmail.com](mailto:mufida.muzakkie@gmail.com)

All authors have reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/sjs.v7i1.96>

### ABSTRACT

**Introduction.** Accurate knowledge of mandibular thickness is necessary for performing surgical treatments on the mandible. The Champy procedure has become the predominant approach for treating fractures of the mandible. Placing plates along these lines is believed to offer the best possible fixing and stability. The objective of this study is to analyze and compare the thickness of the mandible in patients, specifically depending on their gender. The purpose is to gain a more comprehensive understanding of the differences in mandibular architecture across various populations in South Sumatra, Indonesia. **Methods.** This study is a cross-sectional analytical-observational study. The Department of Radiology of Dr. Mohammad Hoesin Central General Hospital, located in Palembang, conducted the study. We included a total of 103 research participants in this study, all of whom met the specified inclusion criteria. **Results.** There is a notable difference in the thickness of the lower jawbone in the front part (A and B) that runs parallel to Champy's line, depending on the person's gender. Males have a greater morphometric thickness of the mandibular symphysis in comparison to females. The thickness of the mandibular symphysis closely links to gender disparities. **Conclusion.** The thickness of symphysis A in men was substantially greater than in females, while the thickness of symphysis B in males was also significantly greater than in females, with a P value less than 0.001.

### 1. Introduction

The mandible is a very variable anatomical structure among individuals. Factors such as age, gender, and genetic predisposition can also impact this variance. Research indicates that the mandibular thickness in women is comparatively less than that in males. Additional research indicates that the mandibular buccal bone has greater thickness in males compared to females; however, this difference does not reach statistical significance. At the first premolar tooth, the mandibular buccal bone is thinnest in women, measuring 2.431 mm, and in

males, measuring 2.491 mm. At the distal root of the mandibular second molar, the thickest point is 7.940 mm in women and 7.859 mm in males. Additional research indicates that men have a higher capacity for mandibular growth and development compared to women. This disparity arises due to men experiencing a more pronounced growth spurt throughout adolescence in comparison to women. Furthermore, men undergo an additional two years of growth and developmental processes.<sup>1-4</sup>

Accurate knowledge of mandibular thickness is essential for performing surgical treatments on the

mandible. The Champy procedure has become the predominant approach for treating mandibular fractures. Placing plates along these lines is believed to offer the best possible fixing and stability. Incorporating mandibular thickness measurements with titanium plate height data can estimate the necessary screw length for bicortical screw placement in mandibular fracture surgeries. This approach reduces the reliance on depth measurements.<sup>5,6</sup>

This study aims to compare the thickness of the mandible between male and female patients in order to gain a better understanding of the variances in mandibular morphology across different populations in South Sumatra, Indonesia. This research has the potential to enhance the planning of orthodontic treatment, reconstructive surgery, and dental rehabilitation by providing a deeper understanding of mandibular thickness and its gender-based variations. Additionally, it can contribute to advancing scientific knowledge in dentistry and maxillofacial medicine in South Sumatra and the surrounding region.

## 2. Methods

This study is a cross-sectional analytical-observational study and conducted at Department of Radiology, Dr. Mohammad Hoesin General Hospital, located in Palembang. We included a total of 103 participants in this study, all of whom met the specified inclusion criteria. The study's inclusion criteria consisted of patients who visited Dr. Mohammad Hoesin General Hospital for treatment between April 2022 and April 2023. These patients were required to have undergone a 3D CT scan, which showed an undamaged mandible, and be at least 20 years old. The study focuses on analyzing the morphometry of the mandibular symphysis thickness as the dependent variable. The research examines gender and age as independent factors.

We extracted the data from patient medical

records at the Radiology Installation at Dr. Mohammad Hoesin General Hospital Palembang. A Siemens CT scanner with 128 slices obtained a 3D reconstruction CT scan of the mandible. The researcher, along with a radiologist, used the Siemens Syngo software program at the Radiology Work Station to assess and quantify the 3D CT scan.

Once you have gathered the necessary data, verify its comprehensiveness once again. Then, organize and analyze it by presenting the frequency of mandibular thickness in terms of mean, median, and standard deviation for each gender group, utilizing numerical data. This study used bivariate analysis to ascertain the correlation between the independent variable, gender (specifically male and female), and the dependent variable, mandibular thickness.

## 3. Results

We collected data from all patients who underwent CT scans of the head, nasopharynx, and face with intact mandible bones. Based on the measurement findings, a total of 211 individuals received a three-dimensional computed tomography (3D CT) scan of the mandible between April 2022 and 2023. Out of them, 103 samples met the specified inclusion criteria. The sample distribution comprised 62 males, accounting for 60.2% of the total, and 41 females, representing 39.8% (Table 1). Table 2 displays the distribution of ages in the sample. It reveals that the 41–59 age group has the largest number of individuals, with 55 people accounting for 53.4% of the sample. The 20–40 age group follows with 34 individuals, representing 33.0% of the population. Lastly, the > 60 age group consists of 14 individuals, making up 13.6% of the sample. Table 3 shows that males have a substantially greater thickness of symphysis A and symphysis B compared to women, with a P value of less than 0.001.

Table 1. The frequency of genders.

Variable	Frequency	Percentage (%)
<b>Gender</b>		
• Male	62	60.2
• Female	41	39.8

Table 2. The frequency of ages.

Variable	Frequency		Percentage (%)
	Male	Female	
<b>Age (y.o.)</b>			
20 - 40	22	12	33.0
41 - 59	34	21	53.4
≥ 60	6	8	13.6
<b>Total</b>	<b>62</b>	<b>41</b>	<b>100</b>

Table 3. The association between gender and each variable related to the thickness of the mandibular symphysis.

Variable	Gender		P-value
	Male	Female	
Symphysis A thickness	8,9 ± 0,8	8,3 ± 0,7	<0,001 <sup>a*</sup>
Symphysis B thickness	12,8 ± 1,1	11,8 ± 0,8	<0,001 <sup>a*</sup>

<sup>a</sup>Independent sample t test; \*significant.

#### 4. Discussion

The findings of this study indicate that men exhibit a higher mandibular thickness in comparison to women at all measurement sites and that gender disparities are significantly associated with mandibular thickness. The findings align with other studies that indicated that women had a lesser mandibular thickness compared to men across all measurement locations. The study also indicated a substantial correlation between mandibular thickness and gender, with a p value of less than 0.001. Additional study indicates that males had denser mandibular bones. At measurement point 1 (symphysis), men had an average thickness of 14.03 mm compared to 13.21 mm in women, but this difference did not reach statistical significance. Consistent with this study, we found that the average measurement at the symphysis B point (a position parallel to the symphysis at the level of the lower edge of the jaw) was 12.8 in males and 12.7 in females.

However, several prior studies have indicated that there is no substantial correlation between gender and mandibular thickness.<sup>7-10</sup>

Additionally, this study reveals that the mandibular bone reaches its maximum thickness at symphysis B. Other studies have also confirmed that the mandibular symphysis is the thickest section of the mandibular bone, while the angle of the mandible adjacent to the ramus of the jaw is the smallest section. Earlier research has indicated that men have a considerably larger mean thickness, height, and height-to-thickness ratio of the mandibular symphysis compared to women. There was a strong correlation between the thickness, height, and height-to-thickness ratio of the mandibular symphysis and the gonial angle. Understanding the different shapes of the mandibular ramus is important for figuring out the right length of screws to use in the osteosynthesis system and making sure the bone is the right thickness during fixation.<sup>11-15</sup>

## 5. Conclusion

There is a notable difference in the thickness of the lower jawbone in the front part (A and B) that runs parallel to Champy's line, depending on the individual's gender. Men have greater morphometric thickness of the mandibular symphysis in comparison to women. The thickness of the mandibular symphysis strongly correlates with gender disparities.

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