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Distribution of Mandibular Fractures Based on Age, Gender, Etiology, and Fracture Region at Abdoel Wahab Sjahranie Hospital Samarinda from 2019 to 2023

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Abstract

Mandibular fracture is one of the fractures in the facial area and is most often caused by trauma. A hard impact to the face can result in a fracture of the mandible. This research aims to investigate the distribution of mandibular fracture based on age, gender, etiology, and fracture region at Abdoel Wahab Sjahranie Hospital Samarinda from 2019 to 2023. This research is quantitative research using descriptive observational research design. The results of this research showed that adolescent age from 12 to 25 years old was the age group in which mandibular fracture cases were found the most, with 34 cases (54%) in this research were from that age group. In terms of gender, mandibular fracture cases were found more in male samples, with 52 cases (82.5%) were male. Traffic accident was the most common etiology of mandibular fractures found, comprising of 47 cases (74.6%) from the total number of cases in this research. The most common fracture region found in this research was the parasymphysis region, with 13 cases (20.6%) in this research had parasymphyseal fracture.

Keywords: Distribution, Mandibular Fracture, Mandibular Fracture Region

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1 Introduction

Humans perform various activities in everyday life. Activities carried out by humans can occur with the help of bones, tendons, ligaments, joints and muscles, which allow humans to move. If there are abnormalities or problems that cause impaired function in these parts, human activity can be disrupted. The most common cases are fractures [1]. Fracture is a condition of total or partial discontinuity of bone continuity, which occurs due to pathological conditions and trauma [2]. The face is a topographically unprotected part of the body causing it to be easily exposed to trauma, so facial bone fractures are a common injury [3]. Fractures can be experienced by all age levels but those with a high risk of fracture are people whose work requires balance, movement problems, people with high-risk jobs can be traumatized. About 70% of oral and maxillofacial fractures always involve the mandible. Generally, fractures in the mandible occur in weak areas such as areas where teeth are impacted and areas where teeth are long rooted [1], [4].

The mandible is a complex bony structure and has vital anatomical articulations with other craniomaxillofacial components. A mandibular fracture is a break in the continuity of the mandibular bone [5]. Classification of mandibular fractures based on the anatomical region of the mandible fractures can occur in the dento-alveolar region, condyle, coronoideus, ramus, mandibular angle, mandibular corpus, symphysis, and parasymphysis [6]. According to the region, the mandible is in a more prominent position and easily receives impact, making mandibular fractures possible when there is trauma to the face. Mandibular fractures in maxillofacial trauma are more common due to the prominent anatomy of the mandible and the comparative lack of support between bone and soft tissue [7].

The main etiology of mandibular fractures varies by geographical location, but motor vehicle accidents are the most common cause [7]. Causes of mandibular fractures other than traffic accidents can be due to fights, work accidents, gunshot wounds, falls, physical activity, trauma during tooth extraction or due to pathological processes [3]. Diagnosis of mandibular fracture can be indicated by the presence of pain, swelling, tenderness, and malocclusion. Other clinical signs such as broken teeth, gaps, unevenness of the teeth, asymmetry of the dental arch, intraoral lacerations, loose teeth, crepitation and trismus also indicate the possibility of a mandibular fracture. The management of mandibular and facial (maxillofacial) fractures was specifically introduced by Hippocrates (460-375 BC) using occlusion guidelines as the rationale and diagnosis of mandibular fractures [16]. Subsequent developments by clinicians used occlusion as a basic concept for the management of mandibular and facial bone (maxillofacial) fractures, especially in their diagnosis and management. This was followed by the development of fixation techniques ranging from the use of head bandages, binding of the maxilla and mandible with wire (intermaxillary fixation), and fixation and immobilization of fracture fragments using bone plates and screws (plate and screw). These techniques are considered simple by creating stability of the fractured bone fragments by the compression method [7], [8], [9].

Based on the results of the Basic Health Research of the Ministry of the Republic of Indonesia in 2018, it was found that the body parts that suffered injuries to the upper limbs had a percentage of 32.7%. One of the injuries to the upper limbs is the occurrence of mandibular fractures. The most common place of injury occurred at home and the environment 44.7%, highway 31.4%, workplace 9.1%, school and its environment 6.5% and others 8.3%. Traffic accidents are one of the priorities for non-communicable disease management based on Decree 116 Menkes/SK/VIII/2003. Traffic accidents rank 9th in DALY (Disability Adjusted Life Year) and are expected to become 3rd in 2020, while in developing countries it ranks 2nd [10], [11].

Based on existing theory, there is previous research on the distribution of mandibular fractures, but there is no research that can represent the distribution of these cases according to age, gender, etiology and fracture region at Abdoel Wahab Sjahranie Hospital Samarinda. Therefore, researchers have an interest in examining the distribution of mandibular fracture patients based on these variables.

2 Methods

This study is a descriptive study by applying the morbidity survey method and aims to determine the distribution of mandibular fracture patients according to age, gender, etiology and fracture region. The data collected were secondary data in the form of medical records of mandibular fracture patients at Abdoel Wahab Sjahranie Hospital, Samarinda Province. This study used a total sampling technique and samples were taken from the population based on predetermined inclusion criteria. The data collection method is to use secondary data collected and processed directly from the object of a study. Secondary data were obtained from the medical records of mandibular fracture patients at Abdoel Wahab Sjahranie Hospital Samarinda from 2019 to 2023. Data collection will be done using Microsoft Excel based on age, gender, etiology and fracture region.

The data that has been obtained will be processed by grouping variables using tables, then analyzed based on the data in the table. This research applies univariate analysis. Univariate analysis is used to analyze data through describing or describing data without drawing conclusions. Data analysis was carried out by calculating the frequency and percentage of each variable. All data obtained will be processed with a computer program, namely Microsoft Excel and Statistical Product Service and Solutions (SPSS) version 28.0. All data obtained will be shown in the form of tables and graphs along with a narrative explanation.

3 Results and Discussions

According to the results of research obtained from the medical records of patients with mandibular fractures at Abdoel Wahab Sjahranie Hospital Samarinda from 2019 to 2023, out of 79 cases of mandibular fractures that could be used as research samples in accordance with the inclusion criteria were 63 cases.

Table 1 Distribution of Mandibular Fractures by Age

Age of Mandibular Fracture Patients	Frequency (n)	Percentage (%)
Childhood (6-11 years)	4	6.3
Adolescent (12-25 years old)	34	54.0
Adult (26-45 years old)	20	31.7
Elderly (46-65 years old)	5	7.9
Total	63	100

The results showed that of the 63 patients obtained from the patient's medical record, the age group (Table 1) with the most mandibular fractures was in the adolescent age group as many as 34 people (54.0%), while the adult age group was 20 people (31.7%), the elderly age group was 5 people (7.9%) and the least age group occurred in the childhood age group totaling 4 people (6.3%). Based on the data above, this study is in line with Astuti and Fitri's research which states that adolescent age groups often experience mandibular fractures. This age group is a productive age where having mobility and outside activities and high busyness are factors that cause many traffic accidents, this age group is also an age group that has a private vehicle [3]. In accordance with Zulmi's research which states that the

adolescent age group often occurs possibly due to the freedom to ride a motorcycle by the patient's parents [12].

The results of this study also showed that there were 4 people (6.3%) who experienced fractures in the childhood age group which is in line with research conducted by Faust, he stated that compared to adults facial bone fractures and mandibular fractures are rare in the pediatric age group because children's activities are still limited even though children's facial bones are more susceptible to fractures [3]. This study also shows that the elderly age group is the second lowest age group after the childhood age group, this is because this age range is included in the advanced adulthood (old age). During this period, both physical and psychological abilities decline rapidly, so it is very rare for people in this age range to experience mandibular fractures [14].

Table 2 Distribution of Mandibular Fracture by Gender

Gender of Mandibular Fracture Patients	Frequency (n)	Percentage (%)
Male	52	82.5
Female	11	17.5
Total	63	100

The results showed that there were 63 cases of mandibular fractures (Table 2) that occurred in men as many as 52 people (82.5%) while in women as many as 11 people (17.5%). Based on this, it shows that men are found more in this study. This study is in accordance with the results of Muhliz's research which states that mandibular fractures that occur are more common in men than women in a ratio of 4: 1 [5]. This is in line with Sjamsuhidajat and Jong's research which states that fractures tend to occur in men and are often related to sports, work, or injuries caused by motorized vehicles. This is assumed because men leave the house more often with high mobility and use motorized vehicles. More mobilization by men is the cause of the high risk of fracture [13].

Table 3 Distribution of mandibular Fracture by Etiology

Etiology of Mandibular Fracture Patients	Frequency (n)	Percentage (%)
Traffic Accidents	47	74.6
Interpersonal Violence	2	3.2
Sports Accidents	1	1.6
Work Accidents	4	6.3
Falls	9	14.3
Total	63	100

The results showed that of the 63 patients with mandibular fractures (Table 3), the most common etiology was traffic accidents as many as 47 people (74.6%), falls as many as 9 people (14.3%), work accidents as many as 4 people (6.3%), interpersonal violence as many as 2 people (3.2%) and sports accidents as many as 1 person (1.6%). This study is in line with Chang's research which states that the highest cause of mandibular fractures is traffic accidents at 43%. The large number of mandibular fracture patients due to traffic accidents in motorcyclists is due to the use of helmets that do not meet the standards, inadequate transportation routes or infrastructure, the influence of alcohol while driving, obtaining a driver's license without strict tests and poor traffic ethics of motorcyclists. In addition, driving speed is also another cause of traffic accidents in motorcyclists [5].

Table 4 Distribution of Mandibular Based on Fracture Region

Fracture Region of Mandibular Fracture Patients	Frequency (n)	Percentage (%)
Dento-alveolar	3	4.8
Parasymphysis	13	20.6
Symphysis	5	7.9
Corpus	5	7.9
Angulus	1	1.6
Condyle	9	14.3
Dento-alveolar and Parasymphysis	1	1.6
Dento-alveolar and Corpus	1	1.6
Dento-alveolar and Condyle	2	3.2
Parasymphysis and Corpus	4	6.3
Parasymphysis and Angulus	2	3.2
Parasymphysis and Condyle	6	9.5
Symphysis and Corpus	3	4.8
Symphysis and Angulus	1	1.6
Symphysis and Condyle	2	3.2
Corpus and Angulus	1	1.6
Corpus and Condyle	1	1.6
Angulus and Condyle	2	3.2
Dento-alveolar, Parasymphysis and Condyle	1	1.6
Total	63	100

The results showed that of the 63 patients with mandibular fractures (Table 4), the most common fracture region was in the parasymphysis as many as 13 people (20.6%), then the condyle as many as 9 people (14.3%). This study is in line with Astuti and Fitri's research which states that the incidence of mandibular fractures based on the anatomical region that occurs most is at the region of the parasymphysis symphysis of the mandible. This study is in line with research conducted by Zulkarnain, he stated that fractures of the parasymphysis symphysis of the mandible occupy the first position with a percentage of the incidence rate of 43.5% and Wijaya's research, he stated that cases of mandibular fractures occur in the parasymphysis symphysis region of the mandible with the assumption that the prominent position of the parasymphysis symphysis causes it to fracture frequently. When viewed from its anatomical structure, the parasymphysis is located anterior to the mandible so that the parasymphysis is the first part to be hit and causes this area to be prone to trauma or fracture [3].

Parasymphysis fractures occur in 15% of all mandibular fracture cases. The mandible occupies the lowest part of the face. The prominent facial bone is severely injured when the lower face is subjected to a high impact with an upward or oblique force [15]. This is different from the research conducted at RSUD dr. Saiful Anwar Malang which showed that the condyle occupies the first position of mandibular fracture cases (35.6% or 128 of 689 cases) which is due to the condyle being one of the weakest places of the mandible in addition to the position of the condyle which is bound by several ligaments, while in this study the condyle area occupies the second position with a total of 9 people (14.3%) [3]. The cause of the difference in the results of this study may be due to a number of 63 samples out of 79 samples of this study did not have complete information about the region of the fracture so that the results obtained for grouping the region of mandibular fractures were limited.

4 Conclusions

The results of this research showed that adolescent age (12-25) years old was the age group in which mandibular fracture cases were found the most, with 34 cases (54%) in this research were from that age group. In terms of gender, mandibular fracture cases were found more in male samples, with 52 cases (82.5%) were male. Traffic accident was the most common etiology of mandibular fractures found, comprising of 47 cases (74.6%) from the total number of cases in this research. The most common fracture region found in this research was the parasymphysis region, with 13 cases (20.6%).

5 Declarations

5.1 Acknowledgements (Optional)

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5.2 Funding

This research did not receive financial support from any source.

5.3 Author contribution

All authors contributed to the writing of this article.

5.4 Etic

This study has been declared ethically feasible in accordance with 7 (seven) WHO Standards 2011 by the Health Research Ethics Committee of Abdoel Wahab Sjahranie Hospital with Decree No. 241/kepk-aws/xi/2023: 241/KEPK-AWS/XI/2023.

5.5 Conflict of Interest

There is no conflict of interest.

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