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ASSESSMENT OF MAXILLOFACIAL TRAUMA IN KANJURUHAN GENERAL HOSPITAL MALANG USING FACIAL INJURY SEVERITY SCALE (FISS) SCORING SYSTEM

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ABSTRACT

Introduction: Maxillofacial trauma is a unique form of trauma that may lead to various facial function disabilities. One method to assess the severity of maxillofacial fractures is the Facial Injury Severity Scale (FISS). This study aims to describe and evaluate the severity of maxillofacial trauma cases in the Emergency Room of Kanjuruhan General Hospital Malang using the FISS scoring system, from January 2022 to December 2023.
Methods: This retrospective study collected data from patients with maxillofacial trauma treated at the Emergency Room of Kanjuruhan General Hospital Malang between January 2022 and December 2023. The variables recorded included age, gender, etiology, helmet use, type of fracture, and treatment received. Each patient was evaluated using the FISS scoring system to determine the severity level.
Results: A total of 73 subjects were included. The youngest patient was 2 years old, and the oldest was 76 years. The average FISS score was 3.37 ± 1.9, with scores ranging from 1 to 9. Most patients had a FISS score of 2 (24.7%).
Conclusion: The majority of maxillofacial trauma cases in the Emergency Room of Kanjuruhan General Hospital were classified as mild according to the FISS scoring system. Further studies with a larger sample size and a complete maxillofacial trauma database are needed to evaluate the prognostic value of the FISS system.

Highlights:

1. Most maxillofacial trauma cases were mild, based on FISS scoring.
2. The average FISS score was 3.37, with most patients scoring 2 (24.7%).
3. Larger studies are needed to confirm FISS as a prognostic tool.

INTRODUCTION

Maxillofacial trauma is one of the most common types of trauma found in the emergency department. It is a form of physical trauma that affects both the hard and soft tissues of the face.[1,2] The causes of maxillofacial trauma are varied, including traffic accidents, physical abuse, falls, sports injuries, and gunshot wounds.

Traffic accidents remain a major concern, causing 1.35 million fatalities annually and being the leading cause of death among children and young adults.[3,4] Traffic accidents also have the highest percentage of disability and death in adults, particularly those under the age of 50, with the greatest prevalence usually affecting individuals aged 21-30 years.[2,5] In Indonesia, after a decline in 2020, traffic accidents increased again in 2021.[4-6] According to reports, between January 2015 and September 2019, there were 3,736 traffic accidents, and 20% (930 people) of these resulted in fatalities.[7,8]

Traffic accident data plays a crucial role in identifying high-risk areas and contributing factors, forming the basis for traffic safety interventions. However, research interest in utilizing this data remains low, with limited national-scale studies. While police-documented accident data is publicly accessible, optimizing traffic survey data, such as the Indonesian Family Life Survey (IFLS), could enhance research accuracy. Integrating self-reported accident data with official records may improve validity, though challenges like reporting biases must be addressed.[9-12]

Traffic accidents, especially those involving motorcycles, are generally caused by driver error, lack of road safety training, inadequate vehicle maintenance, poor road conditions, failure to wear seatbelts or helmets, driving under the influence of drugs or alcohol, and disobeying traffic rules. However, these statistics are not followed by careful road users. Factors such as age, economic status, and educational background influence their safety awareness. Among these, driver negligence is the leading cause of head and facial injuries, including craniofacial trauma.[13-16]

Traffic accidents can cause various types of injuries, such as head and neck injuries, chest injuries, abdominal and pelvic injuries, and extremity injuries. Head trauma is the leading cause of death and the most common injury resulting from traffic accidents involving two- or three-wheeled motor vehicles.[17-18] At Kanjuruhan General Hospital Malang, maxillary fractures were the most common maxillofacial fractures, accounting for 42% of total cases, followed by mandible fractures (23%) and zygomatic fractures (15%). About 37% of patients were referred for treatment to other hospitals with plastic surgeons, as Kanjuruhan General Hospital Malang does not have a plastic surgeon.[7,8]

A scoring system has been in use since the 1970s to measure the severity level in trauma patients. The aim is to identify the prognostic value of trauma, making it a useful tool in research. Initially, most scoring systems only evaluated general trauma, such as the Injury Severity Score (ISS), Traumatic and Injury Severity Score (TRISS), and New Injury Severity Score (NISS).[19] Facial trauma requires a different scoring system because of the many functional impairments it can cause. Several journals have reported the existence of scoring systems for maxillofacial trauma, such as the Facial Injury Severity Scale (FISS) and Mandible Injury Severity Score (MISS). The Facial Injury Severity Scale (FISS) is a simple and easy-to-use scoring system for assessing the severity of maxillofacial trauma. This method describes maxillofacial injuries based on facial anatomical involvement.[20,21]

Although these scoring systems have been introduced in many journals, they are not yet widely used by clinicians due to a lack of awareness of their benefits. In many clinical settings, the assessment of facial injuries still relies on subjective evaluation without a standardized method to quantify severity. As a result, important aspects such as documentation consistency, outcome prediction, and communication among

multidisciplinary teams may be compromised. Implementing standardized scoring systems like FISS could help streamline trauma evaluation and improve patient management.

This study aims to describe and evaluate the severity of maxillofacial trauma cases treated in the Emergency Room (ER) of Kanjuruhan General Hospital Malang using the Facial Injury Severity Scale (FISS), covering the period from January 2022 to December 2023. Specifically, it seeks to identify the distribution of trauma severity based on FISS scores and assess the potential of FISS as a tool for clinical documentation, prognosis assessment, and research. By providing an evidence-based approach to implementing the FISS scoring system in clinical practice, this study is expected to enhance trauma care protocols and facilitate better management of maxillofacial injuries. As the first local research in the Malang region to apply FISS in a clinical setting, the findings may also serve as a foundation for further studies and encourage broader application of FISS across other regions in Indonesia and beyond.

Despite the high frequency of maxillofacial trauma, particularly from traffic accidents, there is limited research on the application of specialized trauma severity scoring systems, such as the FISS, in clinical settings. Current trauma scoring systems, like the Injury Severity Score (ISS), do not address the unique characteristics and functional impairments caused by facial injuries. This knowledge gap in clinical practice is further exacerbated by the limited awareness and utilization of the FISS scoring system, which could aid in predicting outcomes and improving treatment protocols for maxillofacial trauma.

While various trauma scoring systems, such as the ISS, TRISS, and NISS, have been introduced in the literature, there is limited research on the application of FISS specifically for maxillofacial trauma. This knowledge gap is particularly evident in Indonesia, where no local studies have applied FISS to evaluate maxillofacial trauma in a clinical setting. The novelty of this study lies in being the first local research to apply FISS in the evaluation of maxillofacial trauma at Kanjuruhan General Hospital Malang, which can serve as a model for similar healthcare settings in semi-urban regions of Indonesia.

With the FISS, this study not only validates the specificity of maxillofacial trauma severity but also measures its validity in terms of the extent of clinical intervention required and duration of care in the patient. The data gathered are meant to provide the empirical foundation upon which diagnostic accuracy can be improved, treatment can be ordered, and hospital resources can be utilized effectively. In addition, the result of this study can serve as a point of reference in the development of more locally relevant evidence-based clinical guidelines. Also, application of FISS would be able to improve the medical staff's sensitivity to the requirement for standardized evaluation in facial trauma patients. Hence, this research presents a strategic contribution to improving the documentation, assessment, and management system of maxillofacial trauma cases in Indonesia.

METHODS

This study employed a descriptive retrospective design to evaluate the application of the Facial Injury Severity Scale (FISS) in patients presenting with maxillofacial trauma. Medical records of all patients treated for maxillofacial injuries in the Emergency Room of Kanjuruhan General Hospital Malang between January 2022 and December 2023 were reviewed. Cases were identified retrospectively using ICD-10 diagnostic codes. Extracted data encompassed both demographic variables (including age, sex, and name) and clinical characteristics (such as etiology of trauma, helmet usage, fracture type, and the administered treatment). Each case was subsequently assessed using the FISS scoring

system to objectively determine the severity of the facial injury.

This scoring system provides a way to objectively quantify the severity of maxillofacial injuries, helping clinicians in both research and clinical settings to assess trauma and predict prognosis more accurately. The detailed breakdown ensures that various facial injuries, from simple fractures to complex, multi-fracture cases, are appropriately categorized, facilitating better decision-making and treatment planning.The FISS scoring system categorizes injuries based on facial anatomical involvement and provides a quantifiable way to assess trauma severity. Below is a detailed specification of the trauma categories and associated points (Table 1).

Table 1. The Specification in FISS Score.[22]

Trauma Specifications	Points
Mandible:	
Dentoalveolar	1 point
Fracture On Corpus/Ramus/ Symphisis	2 points
Fracture On Condyle/ Coronoid	1 point
Mid-Facial: (Each Facial Fracture Was Give 1 Point, Except For Complex Fracture)	
Dentoalveolar	1 point
Le Fort I	2 points
Le Fort II	4 points
Le Fort III (Unilateral Le Fort Was Given Half The Point)	6 points
Naso-Orbital Ethmoid (NOE)	3 points
Zygomatico Maxillary Complex	1 point
Nasal	1 point
Upper Third Facial	
Roof/ Wall of Orbital	1 point
Fracture Os/Sinus Frontal Displaced	5 points
Fracture Os/ Sinus Frontal Nondisplaced	1 point
Facial Laseration Over 10cm	1 point

RESULTS

Based on medical record data from the Emergency Room of Kanjuruhan General Hospital Malang between January 2022 and December 2023, a total of 73 patients were diagnosed with maxillofacial trauma.

These patients were evaluated across various demographic and clinical factors to better understand the patterns and characteristics of maxillofacial injuries in this setting. The following table 2 provides a detailed distribution of patients by sex, age, cause of trauma, helmet use, and treatment provided, offering insights into the primary factors contributing to these injuries and the initial management approaches.

Table 2. Distribution of Patients by Sex, Age, Cause of Trauma, Helmet Use, and Treatment

Variable	Frequency (%)
Sex	
Male	63.01
Female	36.99
Age (year)	
2-11	17.81
12-25	46.58
26-45	24.66
>46	10.96
Cause of Trauma	
Traffic accident	50.68
Work accident	20.55
Falling from a height	19.18
Interpersonal violence	6.85
Sport accident	2.74
Helmet Use	
Wearing a helmet	63.01
Not wearing a helmet	36.99
Treatment	
Reffered for treatment	36.99
Refused treatment	27.40
Conservative treatment	19.18
Surgery without plate	16.44

The average age of the patients was 32.5 ± 11.5 years, with the youngest being 2 years old and the oldest 76 years old. Of the 73 patients, 46 (63%) were male and 27 (37%) were female. The most common cause of maxillofacial trauma was traffic accidents (50.68%), followed by work-related injuries (20.55%), falls from height (19.18%), interpersonal violence (6.85%), and sports injuries (2.74%). More than half of the patients involved in traffic accidents were not wearing helmets (63.01%).

Regarding treatment, 27 patients (36.99%) were referred to other hospitals due to the need for reconstructive surgery

with plates and screws, which could not be performed at our facility due to the absence of a plastic surgeon. Twenty patients (27.40%) refused treatment, 14 patients (19.18%) received conservative management, and 12 patients (16.44%) underwent surgery without plates and screws (e.g., debridement and suturing).

To evaluate the severity of maxillofacial trauma among patients treated in the Emergency Room, each case was assessed using the Facial Injury Severity Scale (FISS). The distribution of FISS scores recorded between January 2022 and December 2023 is presented in the table below. This scoring system provides an objective measure of facial injury severity and serves as a valuable tool for prognosis estimation, treatment planning, and research in the field of maxillofacial trauma management.

Table 3. Fiss Score Of Maxillofacial Trauma Patients in January 2022 - December 2023

FISS score	Number of Patients	Percentage (%)
1	14	19.18
2	21	28.77
3	8	10.96
4	9	12.33
5	11	15.07
6	4	5.48
7	4	5.48
8	1	1.37
9	1	1.37
Total	**73**	**100**

Using the Facial Injury Severity Scale (FISS), the average score was 3.42 ± 1.9, with a minimum score of 1 and a maximum score of 10. The most common FISS scores were 2 (28.77%) and 5 (15.07%).

Table 4 shows the distribution of maxillofacial trauma severity among patients based on their Facial Injury Severity Scale (FISS) scores. The severity is categorized into three groups: mild, moderate, and severe, according to the score ranges.

Table 4. Distribution of Severity

Severity	Frequency	Percentage (%)
Mild *(FISS Score 1-3)*	43	58.9
Moderate *(FISS Score 4-7)*	28	38.36
Severe *(FISS Score 8-15)*	2	2.74
Total	**73**	**100**

The majority of the patients (58.9%) were classified as having mild trauma, with FISS scores ranging from 1 to 3. This indicates that most cases involved less severe injuries, potentially involving fractures that did not cause significant functional impairment. A significant portion of patients (38.36%) had moderate trauma, with FISS scores ranging from 4 to 7, suggesting a higher level of injury requiring more intensive treatment. Only a small fraction of patients (2.74%) experienced severe trauma, with FISS scores between 8 and 15, highlighting the relatively low frequency of highly severe facial injuries among the study population. This distribution is important for understanding the overall burden of maxillofacial trauma and guiding appropriate resource allocation for patient care in the emergency department.

DISCUSSION

In this study, which included 73 patients diagnosed with maxillofacial trauma, the majority were young adults, with a marked male predominance approximately six times higher than the number of female patients. Traffic accidents emerged as the primary etiology, responsible for more than half of the cases. Notably, a substantial proportion of individuals involved in these incidents were not wearing helmets at the time of injury, underscoring a critical deficiency in adherence to traffic safety regulations, particularly among motorcyclists.

Due to the complexity of certain injuries, many patients required surgical intervention using plate and screw fixation to stabilize facial fractures. However, because Kanjuruhan General Hospital does not have an on-site plastic or maxillofacial surgeon, these patients were referred to tertiary care centers capable of performing reconstructive surgery. Meanwhile, patients with less severe injuries or without functional impairments were managed conservatively with non-operative treatment, such as wound debridement and suturing.

The Facial Injury Severity Scale (FISS) was utilized in this study as an objective tool to quantify the severity of facial trauma. FISS is recognized for its simplicity, reliability, and applicability in emergency settings. It enables rapid assessment and facilitates standardized communication among healthcare providers, including surgeons, emergency physicians, and trauma teams. The tool has been validated in various clinical environments and supports the coordination of multidisciplinary care in facial trauma management.[23-26]

We used the Facial Injury Severity Scale (FISS) to evaluate the severity of maxillofacial trauma because it is a simple scoring system, and the data required for its calculation were readily available from medical records. However, the FISS does not include functional disabilities as one of its determining variables.

According to a study by Bagheri et al. published in 2006, a higher FISS score was associated with increased treatment costs, but there was no clear association between the FISS score and the need for specialized surgical intervention, suggesting that a threshold score may exist for such procedures.[22] Moreover, a study conducted at Dr. Soetomo General Hospital in Surabaya utilized FISS retrospectively with existing medical records and radiological imaging. The researchers determined that FISS could predict hospital stay duration effectively, demonstrating its usability and convenience in clinical practice.[27] Similarly, a study at Sanglah General Hospital in Denpasar applied FISS to grade maxillofacial fracture severity. The study determined that FISS scores had predictive value for length of stay in patients and validated the scale as an easy, widely available method of facial trauma assessment.[28] These studies collectively support that FISS is a simple-to-use system, with data readily obtained from routine medical records, thus making it simple to implement into regular clinical practice for assessment of maxillofacial trauma severity.

In this study, the average FISS score was 3.42, with the most common score being 2, and only one patient recorded a score of 10. These findings indicate that the majority of maxillofacial trauma cases involved relatively minor injuries. In a previous study, Bagheri et al. reported an average FISS score of 4.4, with a maximum score of 13. The differences in score distribution between our study and theirs may be attributed to the higher-velocity trauma observed in Bagheri's study, which resulted in more severe injuries. In contrast, trauma cases in Malang are predominantly low-velocity, often associated with poor compliance with traffic regulations.

This study contributes meaningful epidemiological evidence on maxillofacial trauma within the Malang region of Indonesia, offering data that can guide the refinement of clinical management protocols and inform the development of targeted prevention strategies. The utilization of the Facial Injury Severity Scale (FISS) facilitated a standardized and objective appraisal of injury severity, enhancing the comparability of findings across studies and supporting the establishment of uniform assessment methodologies. Additionally, the results underscore the pivotal role of helmet use in mitigating injury severity, thereby underscoring the necessity for comprehensive public education initiatives and the stringent enforcement of existing traffic safety legislation.

However, several limitations should be acknowledged. The retrospective nature of the study means it relies on medical records,

which may be incomplete or inconsistent. Additionally, the relatively small sample size limits the generalizability of the results. The absence of long-term follow-up data also restricts the ability to evaluate functional and aesthetic outcomes across different treatment modalities.

Despite these limitations, this study offers novel contributions as the first in Malang, Indonesia, to evaluate maxillofacial trauma using the FISS scoring system. It enhances regional understanding of trauma patterns and highlights the challenges faced by local healthcare facilities in managing complex facial fractures, particularly the need for better-equipped hospitals. Moreover, the findings support the critical role of traffic law enforcement in reducing both the incidence and severity of maxillofacial trauma, providing important evidence for public health policy and intervention.

CONCLUSION

The distribution of Facial Injury Severity Scale (FISS) scores in this study indicates that the majority of maxillofacial trauma cases presenting to the Emergency Room of Kanjuruhan General Hospital Malang between January 2022 and December 2023 were classified as mild (FISS scores 1–3). This pattern is likely attributable to the predominance of low-velocity motorcycle collisions, compounded by suboptimal adherence to traffic safety regulations. These findings are reflective of regional trauma trends and may have broader applicability to comparable semi-urban settings across Indonesia. To further elucidate the prognostic utility of the FISS and to inform enhancements in trauma management protocols, future research should incorporate larger, multicenter cohorts and longitudinal outcome assessments.

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CONFLICT OF INTEREST

The authors declare no conflict of interest in this study.

FUNDING DISCLOSURE

The authors declare that no funding was received for this study.

AUTHOR CONTRIBUTION

KKMP contributed to data collection, data analysis, interpretation of the results, manuscript preparation, and revisions. DSN contributed to data collection, data analysis, interpretation of the results, and validation.

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