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LITERATURE REVIEW

Epidemiological Analysis and Management of Oral and Craniomaxillofacial Trauma in Indonesia: A Systematic Review

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Abstrak

Tujuan: Tinjauan sistematis ini bertujuan untuk menganalisis dan mengkaji karakteristik epidemiologi dan manajemen trauma oral dan kraniomaksilofasial pada pasien di Indonesia. **Metode**: Dengan menggunakan panduan PRISMA, tinjauan sistematis dilakukan pada artikel yang dipublikasikan di Scopus, PubMed, ScienceDirect, Google Scholar, dan Garuda hingga Maret 2024. Dalam melakukan seleksi studi, diaplikasikan kriteria inklusi dan eksklusi. **Hasil**: Studi ini menginklusikan 2.928 kasus trauma oral dan kraniomaksilofasial yang diperoleh dari total 44 studi yang terdiri dari 25 laporan kasus, 11 studi restrospektif, 7 studi cross-sectional, dan 1 kasus serial. Hasil rangkuman dari data gabungan, studi ini menyoroti bahwa pasien laki-laki dominan dari seluruh kasus dengan total 80,70% dan rasio laki-laki/perempuan adalah 4,2:1. Trauma oral dan kraniomaksilofasial banyak terjadi pada kelompok usia 21-30 tahun (25,51%), diikuti usia 11-20 tahun (24,15%) dan 31-40 tahun (16,73%). Berdasarkan etiologinya, kasus terbanyak terjadi akibat kecelakaan lalu lintas (87,88%). Menurut jenis/lokasi trauma, kasus yang paling banyak terjadi adalah fraktur mandibula (35,34%), maksila (15,31%), dan zigoma (11,20%). Dalam manajemen kasus trauma, reduksi terbuka dan fiksasi internal (ORIF) merupakan perawatan yang paling banyak dilakukan dengan total 66,71% dari seluruh kasus. **Kesimpulan**: Trauma oral dan kraniomaksilofasial di Indonesia didominasi oleh pasien laki-laki dan kelompok usia produktif dengan fraktur mandibula menjadi kasus yang tertinggi. Dalam hal manajemen, ORIF menjadi pilihan perawatan yang banyak dilakukan.

Kata kunci: epidemiologi; kraniomaksilofasial; maksilofasial; manajemen; trauma

Abstract

Objective*: This systematic review aims to analyze and review the epidemiological characteristics and management of oral and craniomaxillofacial trauma in patients in Indonesia.* ***Methods****: Using PRISMA guidelines, a systematic review of articles published in Scopus, PubMed, ScienceDirect, Google Scholar, and Garuda up to March 2024 was conducted. In selecting studies, inclusion and exclusion criteria were applied.* ***Results****: This study included 2,928 cases of oral and craniomaxillofacial trauma obtained from*

a total of 44 studies consisting of 25 case reports, 11 retrospective studies, 7 cross-sectional studies, and 1 case series. Summary results from pooled data, this study highlights that male patients predominate in all cases with a total of 80.70% and the male/female ratio is 4.2:1. Oral and craniomaxillofacial trauma occurred mostly in the 21-30 year age group (25.51%), followed by 11-20 year olds (24.15%) and 31-40 year olds (16.73%). Based on etiology, most cases occurred due to traffic accidents (87.88%). Based on the type/sites of trauma, fractures of the mandible (35.34%), maxilla (15.31%), and zygoma (11.20%) are the most common. In the management of trauma cases, open reduction and internal fixation (ORIF) is the most frequently performed with a total of 66.71% of all cases. ***Conclusion****: Oral and craniomaxillofacial trauma in Indonesia is dominated by male patients and in the productive age group with mandibular fractures being the highest cases. In terms of management, ORIF is a widely used treatment option.*

Keywords: *epidemiology; craniomaxillofacial; maxillofacial; management; trauma*

INTRODUCTION

Trauma that occurs in the oral and craniomaxillofacial areas causes changes in the anatomy and physiological function of the oral and craniomaxillofacial in the form of scars, deformities, temporomandibular disorders, and oromandibular dysfunction in the parts involved.[1] Trauma is one of the main causes of death and is a serious global public health problem.[2] In the United States, traumatic injuries impact approximately 40 million patients visiting emergency departments annually and globally cause 6 million deaths annually.[3] Various studies reported that the main causes of oral and craniomaxillofacial trauma include traffic accidents which are the most common cause. Additionally, other etiologies include violence or assault, sports, occupational accidents, falls, and others.[4–7]

The incidence of oral and craniomaxillofacial trauma globally is still high and remains a health problem that must be considered, considering that it is one of the causes of quite high mortality. To the best of our knowledge, research with a systematic review related to the epidemiological analysis of oral and craniomaxillofacial trauma has never been conducted in Indonesia. Therefore, it seems interesting and necessary to conduct this epidemiological analysis study to analyze and identify the characteristics, patterns and management of patients with oral and craniomaxillofacial trauma in order to provide an overview and guidance in developing prevention strategies, especially in Indonesia. This study used a systematic review method on published studies with a population of oral and craniomaxillofacial trauma patients in Indonesia.

METHOD

Search Strategy

A systematic review following PRISMA guidelines in Scopus, PubMed, ScienceDirect, Google Scholar, and Garuda until March 2024 was performed. The following keywords: dentoalveolar, dental trauma, oral trauma, maxillofacial, maxillofacial trauma, craniomaxillofacial, craniomaxillofacial trauma, facial, facial trauma, trauma, management, and Indonesia are used together with the use of the Boolean operators AND and OR.

Eligibility Criteria

During the study selection process, inclusion criteria to include articles were applied, which were original research reporting or involving patients with oral and craniomaxillofacial trauma in Indonesia, English and Indonesian manuscripts, and full text access was available. Articles were excluded if they met the exclusion criteria in the form of review articles, short communications, editorials, original research with patients from outside Indonesia, English or Indonesian manuscripts not available, and manuscripts that were not fully accessible. All studies published up to March 2024 were considered in this systematic review, and no limitation on the year of publication in study selection was applied.

Data Extraction

After the studies were included according to the inclusion and exclusion criteria, we then extracted data from the included studies using tables and graphs to summarize the required information such as: author, study design, total patients with cases of oral and craniomaxillofacial trauma, sex, age, etiology, type/sites of trauma, as well as the management provided. Finally, data presentation in graphical form and qualitative analysis related to epidemiological analysis and management of oral and craniomaxillofacial trauma in Indonesia were employed.

RESULT AND DISCUSSION

Results

Study Selection

A search using a combination of keywords in the databases, as well as through a citation search, yielded, after duplicates were removed, a total of 227 studies. Of the 227 records, we eliminated 158 articles due to the irrelevance of the title and abstract to the topic of this systematic review, remaining 69 studies, which we then assessed for eligibility. We excluded several articles with several considerations and reasons, namely unavailability of full text, inappropriate methods, editorial manuscript, unclear data, and overlapping data. Finally, a total of 44 studies were included for review. The entire selection process for this study is depicted in **Figure 1**.

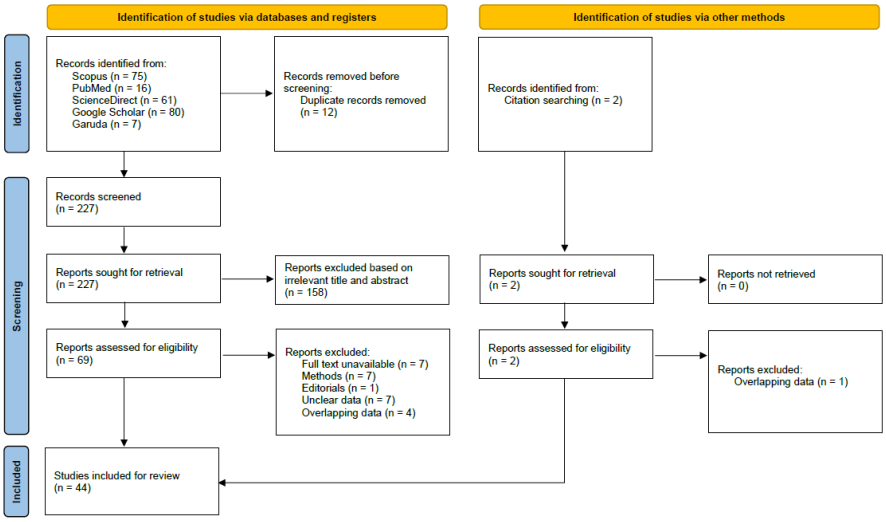


Figure 1. PRISMA flowchart.

Characteristics of Included Articles and Cases

Forty-four studies were included, consisting of 25 case reports, 11 retrospective studies, 7 cross-sectional studies, and 1 case series, and published in the years between 2013 and 2024. A total of 2,928 cases were included in the included articles with a range from 1 to 501 cases, presented in **Table 1**.

Table 1. Included articles and patient demographics.

Author	Design	Total Cases	Sex		Age (Years)						
			M	F	0-10	11-20	21-30	31-40	41-50	51-60	>60
Arini et al.[8]	Case report	1	-	1	-	1	-	-	-	-	-
Susilawati et al.[9]	Retrospective study	414	328	86	10	159	131	65	30	16	3
Putri et al.[10]	Retrospective study	206	165	41	9	53	61	61	11	11	-
Caesario et al.[11]	Retrospective study	187	156	31	26	27	27	27	27	27	26
Juwita et al.[12]	Retrospective study	135	117	18	8	53	37	17	15	4	1
Reksodiputro & Aldino[13]	Case report	1	1	-	-	1	-	-	-	-	-
Firstyananda & Sjamsudin[14]	Case report	1	-	1	-	-	-	-	-	-	1

Author	Design	Total Cases	Sex		Age (Years)						
			M	F	0-10	11-20	21-30	31-40	41-50	51-60	>60
Karyono et al.[15]	Case report	1	-	1	-	-	-	-	-	-	1
Lestari et al.[16]	Case report	1	1	-	-	1	-	-	-	-	-
Rasul et al.[17]	Case report	1	1	-	-	1	-	-	-	-	-
Siregar et al.[18]	Retrospective study	291	221	70	8	53	47	47	47	47	42
Wiargitha & Wiradana[19]	Retrospective study	241	202	39	32	32	60	59	29	29	-
Tanto & Arief[20]	Cross-sectional study	89	74	15	3	34	14	14	11	10	3
Ambriani & Hafiz[21]	Case report	1	1	-	-	-	-	-	-	-	1
Chaeruddin & Istikharoh[22]	Retrospective study	105	91	14	5	31	35	16	8	8	2
Oktora et al.[23]	Case report	1	-	1	1	-	-	-	-	-	-
Ritangnga et al.[24]	Case report	1	1	-	-	-	-	-	-	1	-
Sjamsudin et al.[25]	Case report	3	2	1	-	-	3	-	-	-	-
Tanusantoso et al.[26]	Case report	1	-	1	-	-	-	1	-	-	-
Wildan et al.[27]	Case series	2	2	-	-	2	-	-	-	-	-
Ariobimo et al.[28]	Cross-sectional study	68	57	11	-	26	16	17	3	3	3
Oktora et al.[29]	Case report	1	1	-	1	-	-	-	-	-	-
Samad et al.[30]	Cross-sectional study	100	82	18	26	26	24	14	4	3	3
Wedayanti et al.[31]	Case report	1	1	-	-	1	-	-	-	-	-
Widodo et al.[32]	Case report	2	-	2	-	1	1	-	-	-	-
Ashar et al.[33]	Case report	1	1	-	-	-	-	-	-	1	-
Julia et al.[34]	Case report	1	-	1	-	1	-	-	-	-	-
Nurfuadah et al.[35]	Case report	1	-	1	-	-	1	-	-	-	-
Putri et al.[36]	Retrospective study	70	57	13	-	12	19	13	13	10	3

Author	Design	Total Cases	Sex		Age (Years)						
			M	F	0-10	11-20	21-30	31-40	41-50	51-60	>60
Rakhman et al.[37]	Case report	1	-	1	-	1	-	-	-	-	-
Riswanda et al.[38]	Case report	1	1	-	-	1	-	-	-	-	-
Setiawan & Wibowo[39]	Cross-sectional study	71	59	12	1	28	19	7	4	8	4
Yudianto et al.[40]	Cross-sectional study	12	10	2	-	4	5	2	1	-	-
Adrian & Wibowo[41]	Cross-sectional study	47	40	7	-	9	14	6	6	4	8
Fauzi et al.[42]	Case report	1	1	-	-	-	1	-	-	-	-
Fortuna & Abdillah[43]	Case report	1	1	-	-	-	1	-	-	-	-
Hafiz & Julianda[44]	Case report	1	-	1	-	1	-	-	-	-	-
Hidayat & Fauzi[45]	Case report	1	1	-	-	1	-	-	-	-	-
Prasetyo et al.[46]	Retrospective study	501	406	95	27	108	141	59	59	52	55
Putri et al.[47]	Case report	1	1	-	-	-	1	-	-	-	-
Sjamsudin et al.[48]	Case report	1	-	1	1	-	-	-	-	-	-
Suarta et al.[49]	Retrospective study	144	113	31	2	8	27	27	27	27	26
Yudianto et al.[50]	Retrospective study	177	136	41	24	24	53	34	14	14	14
Rusdiansaputra & Wibowo[51]	Cross-sectional study	40	32	8	6	7	9	4	6	6	2

Etiology of Trauma

Reviewing the causes of oral and craniomaxillofacial trauma, a summary of the included articles found that there are several causes, including traffic accidents (including motorbike, car, bicycle and similar accidents), pedestrian accidents, falls, occupational accidents, sports, violence, and other causes not specifically explained.

Table 2. Etiology of oral and craniomaxillofacial trauma.

Author	Traffic Accidents	Pedestrian Accidents	Falls	Occupational Accidents	Sports	Violence	Others
Arini et al.[8]	1	-	-	-	-	-	-
Susilawati et al.[9]	337	-	32	16	1	9	19
Caesario et al.[11]	187	-	-	-	-	-	-
Juwita et al.[12]	128	-	3	2	1	1	-
Reksodiputro & Aldino[13]	1	-	-	-	-	-	-
Firstyananda & Sjamsudin[14]	-	-	1	-	-	-	-
Karyono et al.[15]	0	-	1	-	-	-	-
Lestari et al.[16]	1	-	-	-	-	-	-
Rasul et al.[17]	1	-	-	-	-	-	-
Siregar et al.[18]	180	-	6	40	-	6	3
Wiargitha & Wiradana[19]	222	-	-	-	-	19	0
Tanto & Arief[20]	71	-	10	-	1	4	3
Ambriani & Hafiz[21]	-	-	-	1	-	-	-
Chaeruddin & Istikharoh[22]	99	-	-	6	-	-	-
Oktora et al.[23]	1	-	-	-	-	-	-
Ritangnga et al.[24]	1	-	-	-	-	-	-
Sjamsudin et al.[25]	2	-	-	1	-	-	-
Tanusantoso et al.[26]	1	-	-	-	-	-	-
Wildan et al.[27]	2	-	-	-	-	-	-
Ariobimo et al.[28]	63	-	3	1	-	1	-
Oktora et al.[29]	1	-	-	-	-	-	-
Samad et al.[30]	100	-	-	-	-	-	-
Wedayanti et al.[31]	1	-	-	-	-	-	-
Widodo et al.[32]	2	-	-	-	-	-	-
Ashar et al.[33]	1	-	-	-	-	-	-
Julia et al.[34]	1	-	-	-	-	-	-
Nurfuadah et al.[35]	1	-	-	-	-	-	-
Putri et al.[36]	59	5	4	1	-	1	-
Rakhman et al.[37]	1	-	-	-	-	-	-
Riswanda et al.[38]	1	-	-	-	-	-	-
Yudianto et al.[40]	12	-	-	-	-	-	-
Adrian & Wibowo[41]	64	-	2	-	-	5	-
Fauzi et al.[42]	40	-	6	1	-	0	-
Fortuna & Abdillah[43]	1	-	-	-	-	-	-
Hafiz & Julianda[44]	1	-	-	-	-	-	-
Hidayat & Fauzi[45]	1	-	-	-	-	-	-
Yudianto et al.[40]	1	-	-	-	-	-	-
Putri et al.[47]	1	-	-	-	-	-	-
Sjamsudin et al.[48]	1	-	-	-	-	-	-
Yudianto et al.[50]	151	7	9	3	-	3	4
Rusdiansaputra & Wibowo[51]	37	-	-	1	-	1	1

Types/Sites of Trauma

The type/location of trauma is determined by the location of the fracture or the hard tissue involved. In this section, one patient may have more than one type of fracture or more than one fracture site. In the unspecified category, all fractures that are not specifically described, other craniomaxillofacial fractures, or mixed fractures that are not clearly described are grouped in this category.

Table 3. Type/sites of oral and craniomaxillofacial trauma.

Author	Type/sites															
	Maxillary	Mandible	Zygoma	Nasal	Orbit	Le Fort	Frontal	ZMC	NOE	Dentoalveolar	Pan facial	Frontonasal	Ethmoid	Temporal	Parietal	Unspecified
Caesario et al.[11]	18	114	28	35	20	32	16	-	-	-	-	-	-	-	-	-
Juwita et al.[12]	30	65	22	25	-	-	-	6	1	10	6	-	-	-	-	-
Reksodiputro & Aldino[13]	-	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-
Firstyananda & Sjamsudin[14]	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Karyono et al.[15]	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Lestari et al.[16]	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Rasul et al.[17]	1	1	-	-	-	-	1	-	1	1	1	-	-	-	-	-
Siregar et al.[18]	48	104	15	12	-	-	5	-	-	-	-	-	-	-	-	52
Wiargitha & Wiradana[19]	23	145	73	-	-	-	-	-	-	-	-	-	-	-	-	-
Tanto & Arief[20]	28	26	5	5	6	-	28	32	1	-	-	-	-	-	-	-
Ambriani & Hafiz[21]	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Chaeruddin & Istikharoh[22]	26	43	29	18	-	-	-	-	-	-	4	-	-	-	-	-
Oktora et al.[23]	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ritangnga et al.[24]	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Sjamsudin et al.[25]	2	2	3	1	1	-	-	-	-	2	-	-	-	-	-	-
Tanusantoso et al.[26]	1	-	1	1	1	-	1	-	-	-	-	-	-	-	-	-
Wildan et al.[27]	1	-	2	2	2	-	1	-	-	1	-	-	-	-	-	-
Ariobimo et al.[28]	16	38	17	7	7	20	3	3	1	-	2	-	-	-	-	-
Oktora et al.[29]	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Wedayanti et al.[31]	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Widodo et al.[32]	-	-	1	-	2	-	-	1	-	-	-	1	1	-	-	-
Ashar et al.[33]	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Julia et al.[34]	-	1	-	-	1	1	-	1	-	-	-	-	-	-	-	-
Nurfuadah et al.[35]	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-
Putri et al.[36]	18	21	31	7	12	7	12	-	-	-	-	-	-	-	-	-

Author	Type/sites															
	Maxillary	Mandible	Zygoma	Nasal	Orbit	Le Fort	Frontal	ZMC	NOE	Dentoalveolar	Pan facial	Frontonasal	Ethmoid	Temporal	Parietal	Unspecified
Rakhman et al.[37]	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Riswanda et al.[38]	1	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-
Setiawan & Wibowo[39]	14	9	8	5	-	-	-	-	1	-	-	-	-	-	-	37
Yudianto et al.[40]	12	12	-	-	-	-	-	-	0	12	-	-	-	-	-	0
Adrian & Wibowo[41]	3	10	6	1	-	-	-	-	1	-	-	-	-	-	-	26
Fauzi et al.[42]	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fortuna & Abdillah[43]	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Hafiz & Julianda[44]	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-
Hidayat & Fauzi[45]	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Prasetyo et al.[46]	105	54	-	24	-	-	-	-	-	-	-	-	-	-	-	-
Putri et al.[47]	1	1	1	1	1	-	1	-	-	-	-	-	-	-	-	-
Sjamsudin et al.[48]	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Suarta et al.[49]	-	-	-	-	-	144	-	-	-	-	-	-	-	-	-	-
Yudianto et al.[50]	15	76	37	10	41	26	-	-	1	96	9	-	-	-	-	-
Rusdiansaputra & Wibowo[51]	40	40	23	9	11	-	-	-	12	-	-	-	-	-	-	-

Management

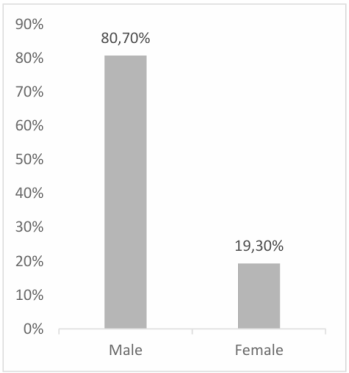
Management or treatment given to patients with oral and craniomaxillofacial trauma is divided into conservative treatment, closed reduction, open reduction and internal fixation (ORIF), and combination treatment. The summary results of the included articles are presented in **Table 4** below.

Table 4. Management of oral and craniomaxillofacial trauma.

Author	ORIF	Closed Reduction	Conservative	Combination	Others
Arini et al.[8]	-	-	-	1	-
Caesario et al.[11]	130	20	7	-	30
Juwita et al.[12]	51	26	22	36	-
Reksodiputro & Aldino[13]	1	-	-	-	-
Firstyananda & Sjamsudin[14]	-	1	-	-	-
Karyono et al.[15]	-	-	-	-	1
Lestari et al.[16]	1	-	-	-	-
Rasul et al.[17]	1	-	-	-	-
Wiargitha & Wiradana[19]	188	-	53	-	-
Tanto & Arief[20]	59	4	11	-	15
Ambriani & Hafiz[21]	1	-	-	-	-
Oktora et al.[23]	-	1	-	-	-
Ritangnga et al.[24]	-	1	-	-	-
Sjamsudin et al.[25]	-	3	-	-	-
Tanusantoso et al.[26]	1	-	-	-	-
Wildan et al.[27]	2	-	-	-	-
Oktora et al.[29]	-	-	-	-	1
Wedayanti et al.[31]	1	-	-	-	-
Widodo et al.[32]	2	-	-	-	-
Ashar et al.[33]	-	1	-	-	-
Julia et al.[34]	1	-	-	-	-
Nurfuadah et al.[35]	1	-	-	-	-
Rakhman et al.[37]	-	1	-	-	-
Riswanda et al.[38]	1	-	-	-	-
Yudianto et al.[40]	1	11	-	-	-
Fauzi et al.[42]	-	1	-	-	-
Fortuna & Abdillah[43]	-	1	-	-	-
Hafiz & Julianda[44]	-	-	-	1	-
Hidayat & Fauzi[45]	-	1	-	-	-
Putri et al.[47]	1	-	-	-	-
Sjamsudin et al.[48]	-	1	-	-	-
Suarta et al.[49]	144	-	-	-	-

Discussion

Distribution of Patients Based on Sex



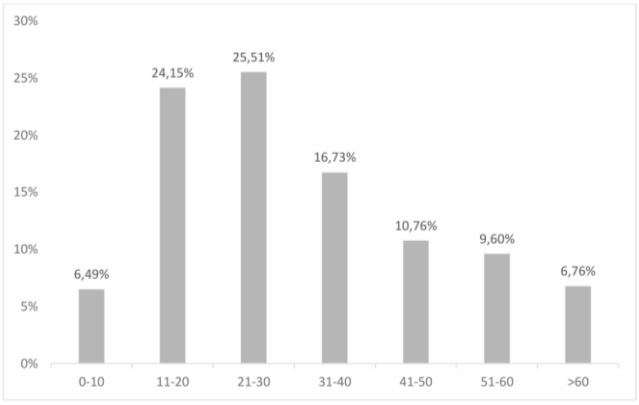
Graph 1. Distribution of patients based on sex.

Graph 1 depicts the prevalence of oral and maxillofacial trauma in terms of sex, showing that oral and craniomaxillofacial trauma in Indonesia often occur in men, as indicated by the prevalence of 80.70% of the total patients and the remainder, 19.30%, were women with a male to female ratio of 4.2:1.

The results of this study are consistent with the results of several studies from other countries which also illustrate that oral and craniomaxillofacial trauma is dominated by male patients. In Türkiye, 70.7% of the total maxillofacial trauma cases were men.[52] As many as 88.1% of cases in Pakistan also male patients dominate maxillofacial trauma cases.[53] In the population of children and adolescents in Brazil, males were also affected by oral and craniomaxillofacial trauma at a rate of 75.9% compared to females.[54] A systematic review study conducted in various countries showed the ratio of men to women was more than 2:1,[5] while a meta-analysis involving 402,339 patients also showed the male to female ratio ranged from 1.5:1 to 3.5:1.[55]

In most countries, men tend to play an active role in the social environment, do a lot of outdoor activities, tend to drive both motorbikes and cars more often, have high mobility, and act more violently; therefore, these factors are believed to contribute to the high cases of oral and craniomaxillofacial trauma in men.[52,56] Studies conducted in Indonesia also highlight that men are vulnerable to traffic accidents because men tend to be more impulsive, drive vehicles at high speed, and have more freedom to explore the environment or travel more compared to women.[57,58]

Distribution of Patients Based on Age

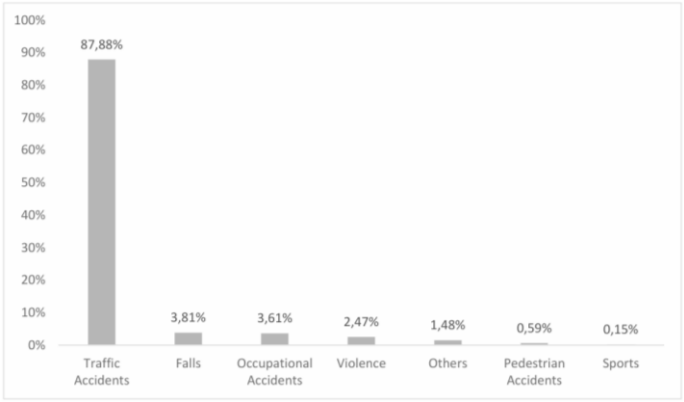


Graph 2. Distribution of patients based on age.

Based on Graph 2, the distribution of oral and maxillofacial trauma patients is 6.49% of the total patients aged 0-10 years, 24.15% aged 11-20 years, 25.51% aged 21-30 years, 16.73% aged 31-40 years, 10.76% aged 41-50 years, 9.60% aged 51-60 years, and 6.76% were patients aged over 60 years. Based on the results, patients aged 21-30 years are the most likely to experience oral and craniomaxillofacial trauma, followed by the age group 11-20 and 31-40 years, and the age group 0-10 years were the ones who experience the least oral and craniomaxillofacial trauma.

The results of this study are in line with the results of research conducted by Wusiman et al., where ages 21-30 years dominate oral and maxillofacial trauma cases in China with the total cases in this age category being 28.1% and followed by ages 31-40 years and 11-20 years.[59] Another study also highlighted the same results where ages 21-30 years had the highest total cases with a total of 26.9%, and ages 31-40 years and 11-20 years followed.[60] Furthermore, a study conducted in Iran showed that cases of oral and maxillofacial trauma at the age of 21-30 years exceeded one third of the total cases, namely 39.9% in Iran[61] and 35.9% in Romania.[62] It is believed that this age range has high mobility, more activity and lots of social activities, so that this age range is vulnerable to oral and craniomaxillofacial injuries and trauma compared to other age ranges.

Etiology of Trauma



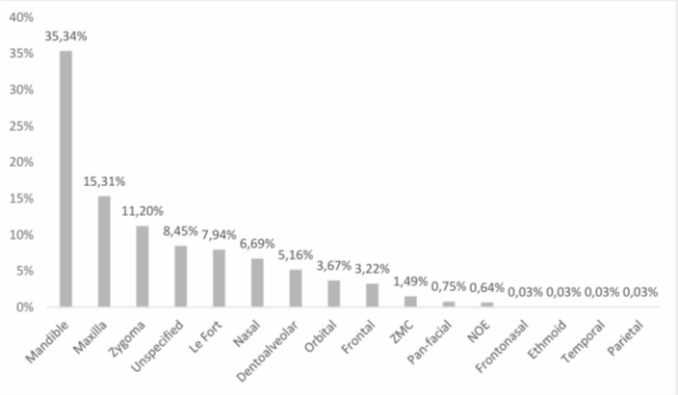
Graph 3. Etiology of trauma.

Based on pooled data from the included studies, depicted in Graph 3, the etiology of oral and craniomaxillofacial trauma is dominated by traffic accidents which account for 87.88% of the total patients, followed by falls (3.81%), occupational accidents (3.61%), violence (2.47%), other unspecified causes (1.48%), pedestrian accidents (0.59%), and the least are sports-related accidents (0.15%).

These findings are in line with studies which stated that traffic accidents were the highest cause of oral and craniomaxillofacial trauma, such as in India (70-80.5%),[63–65] Malaysia (66.3%),[66] Brazil (62.1%),[67] and China (42%).[59] Furthermore, in this study, falls are the second cause of oral and craniomaxillofacial events, in line with research conducted in Malaysia (12.4%),[66] India (19%),[65] and the United Kingdom (21.6%).[68]

The economy is growing rapidly every year, accompanied by an increase in the number of vehicles and transportation, causing traffic accidents to increase as well. In Indonesia, the incidence of traffic accidents remains high and there is a risk of minor injuries as well as serious injuries and even death, which are caused by several factors such as driver risk factors, vehicle factors and/or environmental factors.[69,70] Apart from that, the highest number of traffic accidents occurs in the productive age group which ranges from 26-30 years, followed by the 31-40 year and 16-25 year age groups.[71] This of course contributes to the high incidence of injuries, including trauma to the oral and craniomaxillofacial regions.

Types/Sites of Trauma



Graph 4. Types/sites of trauma.

The summary results and pooled data, depicted in Graph 4, show that mandibular fractures are the most common among all patients involved, namely 35.34%, followed by other maxillary/other than Le Fort (15.31%), zygomatic (11.20%), unspecified (8.45%), Le Fort (7.94%), nasal (6.69%), dentoalveolar (5.16%), orbital (3.67%), frontal (3.22%), zygomaticomaxillary complex (ZMC) (1.49%), pan-facial (0.75%), naso-orbito-ethmoidal (NOE) (0.64%), and the least are frontonasal, ethmoidal, temporal and parietal fractures with 0.03% each.

In line with other studies, the mandible is most frequently affected by trauma in the form of fractures. This was reported in several studies conducted in India showing up to 47-64% of patients[63,65,72] and in China with 31.97% of mandibular fracture cases.[59] Furthermore, a study by Wusiman et al. also in line with our study which reported that fractures of the mandible, maxilla, and zygoma were the most common types of trauma. The high number of mandibular fracture cases among other fracture locations is possible because the lower jaw or chin is the most prominent part of the face which can at any time experience direct injury while driving and in a traffic accident, even if wearing a helmet or other safety device.[64] Additionally, our study reports that traffic accidents are the highest cause of oral and craniomaxillofacial trauma.

Management

The airway in patients with oral and craniomaxillofacial trauma is crucial in emergency care, because injuries to the head and neck region have the potential to cause disruption or obstruction of the airway due to edema, hematoma, or fracture, or the presence of foreign objects such as dentures. This condition is worsened if the patient experiences decreased consciousness, is under the influence of alcohol or drugs, changes in laryngeal and pharyngeal reflexes, which increases the risk of aspiration.[73] In addition, if the patient experiences significant bleeding, hemostasis must be prioritized to be carried out immediately, either through direct pressure, sutures, or staples, compared to treating the fracture fixation first.[74] Therefore, the initial assessment and Advanced Trauma Life Support (ATLS) principles in first treatment must be carried out immediately after the patient arrives at the emergency department.[75]

There are several treatment options for patients with oral and craniomaxillofacial trauma, including ORIF which involves surgery and internal fixation using plates, screws, and wires; closed reduction which involves returning to the original position without surgery; as well as conservative treatment. Furthermore, ORIF is reported to be an effective treatment option for maxillofacial fractures due to its several advantages such as facial contour improvement, functional occlusion, prevention of malocclusion, and rapid recovery.[76,77] In this study, 66.71% of patients underwent ORIF treatment, the remaining 11.10% underwent conservative treatment, 8.59% underwent closed reduction treatment, 8.00% received combination treatment, and 5.61% are others, including refusing treatment, tooth extraction and alveolectomy, as well as elevation craniotomy.

CONCLUSION

Based on the summary from pooled data, this systematic review concludes that in the incidence of oral and craniomaxillofacial trauma in Indonesia, male patients predominate in all cases with a male/female ratio of 4.2:1. Oral and craniomaxillofacial trauma often occurs in the productive age group, namely 21-30 years old, followed by 11-20 years old and 31-40 years old. Based on the etiology, more than 80% of cases occur due to traffic accidents, whether motorbike, car or bicycle accidents. Meanwhile, based on the type/sites of trauma, fractures of the mandible are the most common compared to other types/sites of trauma. In the management of trauma cases, ORIF is the most frequently performed of all cases. As a suggestion, future research to explore the prevention of oral and craniomaxillofacial trauma in terms of etiology, more in-depth trauma management, and post-traumatic rehabilitation may be warranted.

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CONFLICT OF INTERESTS (If Any)

None

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