Profile of Road Traffic Accident Victims Admitted at Bhayangkara Pusdik Sabhara Porong Hospital

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ARTICLE INFO	ABSTRACT
Keywords: *Traffic Accident, Trauma, Forensic Examination* Submitted: October 05th 2022 Reviewed: October 17th 2022 Accepted: October 27th 2022	**Background:** Traffic accidents are a health problem in forensic medicine that often occurs in society and needs attention, mainly because it is still a major problem in implementing road transportation in Indonesia. Traffic accidents increase yearly along with the increasing number of road users and the ease of ownership of transportation facilities. In 2012, the death toll from traffic accidents in Indonesia was 29,544, with a case fatality rate (CFR) of 14.95%. In 2013, the victims died from traffic accidents, namely 26,416 people, with a case fatality rate (CFR) of 15.98%. In 2014 the victims died due to traffic accidents, namely 28,297 people with a case fatality rate (CFR), traffic accidents of 17.16%. In 2015 the victim died due to traffic accidents, namely 26,185 people with a *case fatality rate* (CFR) traffic accident of 15.37%. **Objective:** To describe profile of road traffic accident victims admitted at Bhayangkara Pusdik Sabhara Porong Hospital in 2021-2022. **Methods:** This research is a retrospective descriptive study. The research sample used was medical record data of traffic accident patients examined at Bhayangkara Pusdik Sabhara Porong Hospital in 2021-2022. **Result:** The incidence of traffic accidents at Bhayangkara Pusdik Sabhara Porong Hospital can be described as follows; 71.4% are male. Thirteen people (37.1%) are aged 15-29 and based on where the most occurrences on the Surabaya-Malang highway, there are ten people (28.6%), and then based on the time of the incident where the most happened at 12.00 – 18.00, namely 12 people (34.2%), based on the position of the victim where the most were as motorists. Motorcycles have as many as 26 people (74.3%), and based on the type of injury where the most were abrasions is 24 people (40%). **Conclusion:** The description of the incidence of traffic accidents at the Bhayangkara Pusdik Sabhara Porong Hospital in 2021-2022 is mainly experienced by men of productive age. It occurred on the Surabaya-Malang highway, which has a heavy traffic flow; the time of the incident was during working hours, position the victim was a motorcyclist, and the most common types of injuries were blunt force trauma.

Introduction

Traffic is a facility for moving objects or people from one place to another. Traffic can have a direct or indirect positive impact on the economy, education, tourism, and health. In addition to having a positive impact on mobilization, there are also unwanted negative impacts, such as congestion, increased air pollution, and traffic accidents (Ministry of Health Republic of Indonesia, 2017). Traffic accidents are a health problem in forensic medicine that often occur in society and need special attention because they have still become a major problem in implementing road transportation in Indonesia. Traffic accidents increase yearly along with the increasing number of road users and the ease of ownership of transportation facilities.

According to the World Health Organization (WHO) 2018, in every year There are 1.35 million people die due to traffic accidents around the world. Every 24 seconds, one person loses his life on streets worldwide. Meanwhile, according to the Ministry of Health of the Republic of Indonesia, Indonesia (RI) 2017, in Indonesia, an average of three people die every hour due to road accidents. A large number of accidents is caused by several things, namely: 61% are caused by human factors, 9% are caused by factors vehicles, and environmental factors and

infrastructure cause 30% (Handoko, 2018; Indonesia Statisic Center, 2018).

In 2012, the death toll from traffic accidents in Indonesia was 29,544, with a case fatality rate (CFR) of 14.95%. In 2013 the victim died due to traffic accidents, namely 26,416 people, with a case fatality rate (CFR) of 15.98%. In 2014 the victims died due to traffic accidents, namely 28,297 people, with a case fatality rate (CFR) of traffic accidents of 17.16%. In 2015 the victims died from traffic accidents, namely 26,185 people, with a case fatality rate (CFR) of traffic accidents of 15.37%. (Indonesia Statisic Center, 2018).

Based on data from the Sidoarjo Police Traffic Unit, accidents that occurred throughout 2018 were more serious than the previous year. The vehicles involved in the accident are still dominated by motorcycles. Throughout 2018, there were 1,518 accidents in Delta City. An increase of 4.98 percent compared to 2017, which counted 1,446 accidents. The death toll also rose by 5.33 percent. From 244 victims in accidents throughout 2017, it increased to 257 in 2018 (Taufik, 2019).

From the results of a survey conducted by researchers on September 8, 2022, at the Bhayangkara Pusdik Sabhara Porong Hospital, the Medical Record section. There were 41 victims of traffic accidents who were taken to the Bhayangkara Pusdik Sabhara Porong

Hospital in 2021-2022. Based on the above background, researchers are interested in researching the description of events in traffic accident victims at Bhayangkara Pusdik Sabhara Porong Hospital in 2021-2022.

Methods

This research was conducted in the Forensic Medicine section of the Bhayangkara Pusdik Sabhara Porong Hospital from August 2021 to August 2022. The study used a descriptive method using a retrospective method. The research sample used was medical record data of traffic accident patients examined at Bhayangkara Pusdik Sabhara Porong Hospital in 2021-2022, which met the inclusion and exclusion criteria. The sampling method used is simple random sampling.

Result and Discussion

The number of patients who were victims of traffic accidents brought to the Bhayangkara Pusdik Sabhara Porong Hospital in 2021-2022 who met the inclusion criteria and did not enter the exclusion criteria was 35 samples. From the research sample, which consisted of 35 patients, the description of patients who died in traffic accidents based on gender,

age, time of occurrence, and type of injury was obtained as follows:

Table 1. Frequency Distribution By Sex

Sex	Frequency	Presentation (%)
Male	25	71,4
Female	10	28,6
Total	35	100.00

Table 2. Frequency Distribution By Age

Age	Freq	Precentage (%)
0-4 year old	0	
5-14 year old	6	17,2
15-29 year old	13	37,1
30-44 year old	6	17,2
45-59 year old	9	25,7
>60 year old	1	2,8
Total	35	100.00

Table 3. Frequency Distribution by Time of Occurrence

Time of Occurence	Freq	Precentage (%)
00.00 – 06.00	8	22,9
06.00 – 12.00	9	25,7
12.00 – 18.00	12	34,2
18.00 – 00.00	6	17,2
Total	35	100.00

Table 4. Frequency Distribution by Place of Occurrence

Place of Occurence	Freq	Precentage (%)
Road way	35	
Surabaya - Malang	10	28,6
Surabaya - Banyuwangi	6	17,2
Gempol	4	11,4
Porong	3	8,5
Pasuruan	2	5,7
Others	10	28,6
Alley	0	0
Total	35	100.00

Table 5. Frequency Distribution by Victim Position

Victim Position	Freq	Precentage (%)
Passenger	6	17,2
Motorbike Driver	26	74,3
Car Driver	0	0
Pedestrian	3	8,5
Total	35	100.00

Table 6. Frequency Distribution by Wound Type

Wound Type	Passenger	Pedestrian	Motorbike Driver	Total	Precentage (%)
Bruises	4	0	10	14	23,3
Abrasions	4	2	18	24	40
Abraded	1	1	14	16	26,7
Fracture	1	1	4	6	10

A traffic accident risk factor is a potentially dangerous condition that can trigger disease in a certain person or group. Three main risk factors can cause traffic accidents, namely humans, vehicles, and the environment (physical & socio-economic environment) (Ministry of Health Republic of Indonesia. 2016; Mohammed, 2019).

Human Risk Factor

It is divided into three parts (Ministry of Health Republic of Indonesia, 2016); Inherent risk factors, namely risk factors that any interference cannot identify with the individual, such as age, gender, and genetics; Behavioral risk factors are the behavior of drivers who are at risk for injury due to KLLD, such as, not wearing personal protective equipment (PPE), using mobile phones, driving at high speeds, smoking, consuming alcohol and drugs (amphetamine); Drivers conditions/ diseases include fatigue, drowsiness, musculoskeletal disorders, hearing loss, visual impairment, epilepsy, hypertension, and diabetes.

Vehicle and Socio-Economic Factors

People, especially those living in low- and middle-income countries, generally have two or three-wheeled vehicles compared to those with four or more wheels. These vehicles are usually used for work or other family purposes. In contrast to the condition of people in developed countries, they prefer to drive four-wheeled vehicles for family needs and two-wheeled vehicles for leisure or recreational activities. This condition is influenced by the community's socio-economic status, especially related to the income of the community in general (Sharma, 2008; Mohammed, 2019). In 2013, there were more than 104.2 million motorized vehicles in Indonesia. Users of two-wheeled and three-wheeled vehicles reach 81% more when compared to people who use four-wheeled vehicles, which are only around 10%. The rests are heavy truck and bus users. This number continues to increase yearly to reach more than 138.5 million motor vehicles in 2017, with a growth rate of around 7.40% annually. With a large number of two-wheeled motorized vehicles, this condition significantly impacts the high number of high-traffic accidents and deaths caused by these accidents. More than 60% of the total traffic accidents in Indonesia in 2013 were related to two-wheeled vehicles. This percentage increased significantly in the following year, reaching 71% or 108,883 cases of the total traffic accidents in 2014 (Kirono, 2014; The Association of South East Asia Nation, 2016).

Environtment Factor

Environmental factors significantly influence the occurrence of traffic accidents and result in increased mortality (mortality rate) and disability (Disability-Adjusted Life Years). An increase in the number of motorized vehicles without being followed by an increase in transportation infrastructures such as roads, traffic lights at every intersection, and particular roads for pedestrians and bicycles will cause significant problems for the plan to reduce

the number of traffic accidents. Based on the 2018 Central Statistics Agency report, the increase in road infrastructure until 2017 reached 539,353 km. Meanwhile, the number of vehicles reached more than 118.9 million in 2017, and more than 6 million vehicles have increased since 2016. This condition is a particular problem for the increase in traffic accidents (Indonesia Statisic Center, 2018; Mohammed, 2019).

Mechanism of Accident

Based on the epidemiological point of view, an accident is an event as a result of the interaction between three components, namely: agent (cause), host (recipient), and environment (environment) (Ministry of Health Republic of Indonesia, 2016).
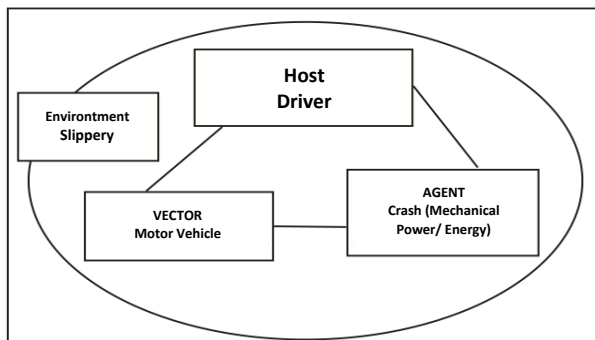
Picture 1. Interaction Scheme of 3 Traffic Accident Components (Ministry of Health Republic of Indonesia. 2016)

1. Agent

    In particular diseases, especially infectious diseases, the cause can be a single bacterium (agent). It is different from accidents; it found a little difficulty

because of several factors involved in determining the occurrence of accidents (multiple). In traffic accidents, the causes can lie in: (1) the condition of the road, (2) the condition of the vehicle, (3) the driver of the vehicle, and so on. Injury or death coincides with the accident or within a short time.

2. Host

    A host is a person who suffers injury or death in an accident. Host factors are intrinsic elements that affect susceptibility to the cause (agent). To determine which hosts are vulnerable, it is necessary to examine the characteristics of the hosts, such as age, gender, education, occupation, and others. There is a marked difference in the form of an accident that befalls a person.

3. Environtment

    The environment describes the state of the environment at the scene. "Environmental" factors are extrinsic elements that influence the occurrence of accidents. In "environmental factors," apart from physical factors (weather, lighting, road conditions, and others), some include socio-cultural environmental factors.

Injuries in Traffic Accidents

Most traffic accidents cause trauma due to blunt force violence. Hard and blunt objects can cause various types of trauma (Iwan, 2017; Idries, 2011; Mohammed, 2019), including:

1. Bruises (Contusion)

Bruises are a wound characterized by tissue damage without any discontinuity of the skin surface. The damage is caused by capillary rupture so that blood flows out and seeps into the surrounding tissue. Bruises are not only on the skin but may also be found in internal organs, such as the lungs, heart, brain, and muscles (Iwan, 2017).

One form of bruising that can provide information about the shape of a blunt object is "marginal hemorrhages." For example, if the victim's body is run over by a vehicle tire, where there is pressure, it does not show abnormalities. The bleeding will pull over to form a bleeding edge that matches the shape of the gap between the two edges of the tire.

2. Abrasions

Scratches are wounds caused by damage or detachment of the outer layer of the skin. The characteristics are irregular wound shape, sometimes minor bleeding, the surface covered by crusts (a serum that has dried), and reddish-brown color. On microscopic examination,

some parts are still covered by epithelium and tissue reaction (inflammation).

In the case of a traffic accident where a vehicle tire runs over the victim's body, the abrasions pressed on the victim's body are often the prints of the vehicle's tires. The prints, especially if the tires are still in good condition, where the "blossoms" of the tires are still more pronounced, for example, parallel zigzag shape. Thus, in a hit-and-run case, information on the characteristics contained in the victim's body is very useful in the investigation.

3. Open Wound

An open or torn wound is caused by contact with a blunt object with force capable of tearing the entire layer of skin and underlying tissue, with the following characteristics: The shape of the wound boundary line is irregular, and the edges of the wound are uneven. Because some of the tissue was destroyed), the wound cliffs were uneven, and there were tissue bridges around the wound boundary lines and bruises found.

4. Fractures

The hardness of a blunt object is strong enough to cause fractures. The presence of fractures can be detected if there are signs: There are deformities

compared to normal, There is a difference in length, primarily when it occurs in the limbs, When moved, hear a creaking sound (crepitus), The pattern of fractures that occur depends on the location of the fracture. Skull bone fractures often occur in the form of impression fractures; namely, parts of the bone are broken and pushed into. These skull bone fractures can result in bleeding in the skull cavity in the form of epidural, subdural, or subarachnoid hemorrhage and damage to the lining of the brain and brain tissue.

In the case of a traffic accident, fractures that occur can provide information on the direction of the vehicle that hits the victim's leg. When hit from behind, the broken bone will be pushed forward and can tear the muscles and skin in the front leg area. The opposite happens when the victim is hit from the front. Thus, based on the nature of the fracture, it can be estimated where the violence came from and hit the victim's body. This is necessary for reconstructing events other than injuries from blunt objects. Some injuries in traffic accidents can also be caused by sharp objects, such as cuts caused by a tip—motorcycle license plate. Wounds caused by violence by objects that break easily, such as broken car windows, the only injuries found are abrasions and

cuts because the windshield is deliberately designed so that if it breaks, it will break down into small pieces. Burns can also occur during an explosion following an accident or minor burns due to contact with high-temperature vehicle parts, such as exhaust (Ramadhani, 2019; Bezabih, 2021).

This study shows that there are more male victims of accidents than women. The results of this study are supported by other studies where men are the most victims of accidents compared to women, with a total of 101 male victims (Yandi, 2020). The same study was conducted by Putra *et al.,* which found that the male gender dominated traffic accident victims. Men as many as 64 people (Putra, 2022). The thing that causes men to experience more traffic accidents is that the highest level of work activity is in the male sex, so they have a higher risk of traffic accidents. In addition to the activity level, other factors, such as having a riskier lifestyle, such as consuming alcohol and smoking while driving, interferes with the driver's focus in traffic (Ratu, 2021). Men, while driving, tend to show emotional characteristics such as irritability, impatience, desire to drive fast and aggressively, and ignoring danger (Putra, 2022).

Based on age, the results of this study indicate that accident victims aged 15-29 years are the most common age group who become victims of traffic accidents. The results of this study are supported by other studies where young adults are the most victims of accidents compared to other ages, with a total of 102,881 people in the 16-25 year age group and 343,743 people in the 26-30 year age group.20 The same study was conducted by Putra *et. al,*. They found that the traffic accident victims were dominated by the age group 15-29 years, as many as 43 people or 44.8% of the total number of accident victims during 2018-2019 at the General Hospital H. A. Thalib Kerinci (Putra, 2022). The number of victims from the age group is young adults because the mobility of the early adult age group is higher than that of other age groups. According to data analysis conducted by the Directorate General of Land Transportation, drivers aged 16-30 years have the most traffic accidents. Early adulthood is a productive age group that has higher mobility compared to other age groups (Putra, 2022; Herawati, 2019).

Based on the incident's time, this study's results were similar to the research conducted by Herawati, 2019. where most accidents occurred at 06.00-12.00 and 12.00-18.00, each of which

was 31%. These hours are the morning, afternoon, and evening peak hours. This result indicates that the denser the road traffic, the more accidents that occur, or the quieter the traffic, the less the chance of accidents (Herawati, 2019). This is also in accordance with research conducted by Saputra, 2017 where the results of data analysis on accidents On highways, it is recorded that most accidents occur in the period of 00.00–06.00 (early morning), which is 17%, while another 22% of accidents occur at 06.00-12.00 (morning), and the period during the day is 12.00-18.00. by 44%, and at 18.00-24.00 (night) which is 17%. If observed, most road traffic accidents occur at 12.00-18.00, as many as 44% of cases, because that time is a busy/productive time for road traffic in Indonesia (Saputra, 2017). In 2020, Yandi's research shows that traffic accidents traffic based on several characteristics, namely the day of the incident (33 victims on Sundays) and the time of the incident (34 victims from 6 am to 2 am). According to Vara *et al*., 2021 traffic accidents often occur during the day with a period of 12.00-18.00 due to decreased body stamina due to fatigue doing activities in the morning (Yandi, 2020; Vara, 2021).

Based on the location of the incident, in this study, it was found that

the location of the most frequent accidents was on the Surabaya-Malang road. This is supported by research conducted by Maisaroh, 2021, where Jalan Raya Surabaya - Malang is one of the roads in East Java province which is prone to accidents with its status as a national road. This route is one of the links between Surabaya, which is the center of economic and socio-cultural activities. In East Java Malang, the area is known as one of the main tourist destinations in East Java. Therefore, many residents outside Surabaya or Malang came in droves. This has an impact on the concentration of activity in both cities. Activities that enter the city of Surabaya or Malang impact increasing road users. This factor can encourage the growth of transportation facilities and infrastructure to support meeting these needs, and if not balanced adequately, it will cause accidents.

This study found that the most victims were motorcycle riders, namely 26 people (74.3%). Several previous studies have also obtained similar results. In the results of Riskesdas in 2018, it was found that the cause of injury in traffic accidents often occurs in motorcycle riders (Susanti, 2021). In Indonesia, there is an increase in motorcycle users, and many motorcycle riders drive their vehicles carelessly. The increase in motorcycle users can be caused by poor public transportation (Mohammed, 2019). Another study stated that young motorcycle drivers have risky behaviors, including the habit of driving at high speed, drinking alcohol, desire to seek sensation, and lack of experience controlling the vehicle. Uncontrolled emotions also influence risky driving habits. Based on statistical reports in many countries, the causes of traffic accidents are aggressive behavior of drivers, stress, emotional instability, depression, and insecurity while driving (Susanti, 2021).

The four groups' most common types of injuries were abrasions, with 24 wounds (60%), and the least common was fractured, with six wounds (15%). The results of this study are supported by several other studies, which also show that abrasions are a type of wound often found in traffic accidents. In a study by Putra *et, al.,* about the Overview of Wound Patterns in Traffic Accident Cases at the Mayjen H. A. Thalib Kerinci Hospital for the 2018-2019 period, the results of the most frequent type of wound were abrasions (Putra, 2022). Another study by Indriani and Yulianti explained that Most wounds are abrasions. Another study in India also explained that abrasions were the most

common injuries in traffic accidents (Ambade, 2021).

This is because abrasions occur more quickly than other types of wounds, where abrasions are formed due to displacement of the superficial skin epithelial layer due to friction against a rough surface. Meanwhile, other types of wounds require more energy to cause bodily injury than the energy needed to cause abrasions. Scratches are often found in motorcycle accidents because when falling from a motorcycle, the rider is usually dragged by the repulsive force between two objects; it can be due to friction between the road surface, clothing, and skin, causing abrasions to the affected body part. Motorcycle accident victims generally experience more than one injury, either from the type of injury or the location of the injury. Pedestrian abrasions are often found due to the tracking of blunt objects and being dragged due to collisions with vehicles (Putra, 2022).

The most common abrasions in traffic accidents are sliding abrasions. Shear abrasions are caused by direct pressure on the skin accompanied by a sliding motion. Shear abrasions can determine the direction of the cause of violence, where the first part that slides touches the blunt object will provide a more even boundary, and when the blunt

object leaves the displaced skin, it will have an uneven border. There are scratches on the epidermis that run parallel (Putra, 2022).

Conclusion

The Description of traffic accidents at Bhayangkara Pusdik Sabhara Porong Hospital, based on gender, age, time of occurrence, scene, the position of the victim, and type of injury, are in accordance with the three main risks of traffic accidents. The main risk is human, vehicle, and environmental factors.

Reference

Aflanie, I., Nirmalasari, N., Arizal, M. H. 2017. *Ilmu Kedokteran Forensik & Medikolegal*. Jakarta: Rajawali Press.

Ali, A. M., Kamarudin, A., Ahmed, M. M., Deprizon, S. 2019. A Review of Traffic Accident and Related Practices Worldwide. *The Open Transportation Journal* 13: 65-83.

Ambade, V. N., Sirsat, K. B., Manu, S. 2021. Pattern Of Injuries In Different Types Of Victims Of Road Traffic Accident In Central India: A Comparative Study. *J Forensic Sci Res* 5: 7-11.

Bezabih, Y,. Tesfaye, B., Melaku, B., Asmare, H. 2021. Pattern of Orthopedic Injuries Related to Road Traffic Accidents Among Patients Managed at the Emergency Department in Black Lion Hospital, Addis Ababa, Ethiopia, 2021. *Open Access Emerg Med* 14: 347-354.

Djaja, S., Widyastuti, R., Tobing, K., Lasut, D. and Irianto, J., 2016. Situasi Kecelakaan Lalu Lintas Di Indonesia,

Tahun 2010-2014. *Jurnal Ekologi Kesehatan* 15(1).

Hardoko, E. 2018. WHO: Tiap 24 Detik Orang Tewas Akibat Kecelakaan Lalu Lintas. *pemilu.kompas.com*. 10 March 2022 (17:39).

Herawati. 2019. Karakteristik Dan Penyebab Kecelakaan Lalu Lintas Di Indonesia Tahun 2012. *Warta Penelitian Perhubungan* 26(3):133-141.

Idries, A. and Tjiptomartono, A. 2011. *Penerapan Ilmu Kedokteran Forensik dalam Proses Penyidikan*. Jakarta: Sagung Seto.

Indonesia Statisic Center. 2018. Jumlah Kecelakaan, Korban Mari, Luka Berat, Luka Ringan, Dan Kerugian Materi Yang Diderita Tahun 1992-2018. *https://www.bps.go.id/linkTableDinamis/view/id/1134*. 21 March 2022 (13:.45).

Indonesia Statisic Center. 2018. Panjang Jalan Menurut Jenis Permukaan (Km) Tahun 2015 – 2017. *https://www.bps.go.id/indicator/17/51/2/panjang-jalan-menurut-jenis-permukaan.html* 01 April 2022 (10:05).

Indonesia Statisic Center. 2018. Perkembangan Jumlah Kendaraan Bermotor Menurut Jenis (Unit) Tahun 2015-2017. *https://www.bps.go.id/indicator/17/57/2/perkembangan-jumlah-kendaraan-bermotor-menurut-jenis.html* 01 April 2022 (10:16).

Kirono, C. Mewujudkan Keselamatan Jalan Oleh Pengendara Sepeda Motor Melalui Pembenahan Sektor Hilir. Korp Lalu Lintas RI, 2014.

Ministry of Health Republic of Indonesia. 2016. Petunjuk Teknis Pemeriksaan Deteksi Dini Faktor Risiko Kecelakaan Lalu Lintas Bagi Pengemudi. Available at: *http://p2ptm.kemkes.go.id/uploads/2016/10/Petunjuk-Teknis-Pemeriksaan-Deteksi-Dini-Faktor-Risiko-Kecelakaan-Lalu-Lintas-Bagi-Pengemudi.pdf* 22 April (10:23)

Ministry of Health Republic of Indonesia. 2017. Rata-rata Tiga Orang Meninggal Setiap Jam Akibat Kecelakaan Jalan. *kemkes.go.id*. 13 March 2022 (14:35).

Misaroh, S. 2021. Analisis Kecelakaan Lalu Lintas Pada Ruas Jalan Raya Surabaya - Malang (Studi Kasus: Jln Raya Surabaya-Malang KM 34-68). *Thesis*. Fakultas Teknik Sipil Universitas Yudharta Pasuruan. Pasuruan.

Mohammed, A. A., Ambak, K., Mosa, A. M., Syamsunur, D. 2019. A Review of the Traffic Accidents and Related Practice Worldwide. *The Open Transportation Journal* 13: 65-83.

Peraturan Kepala Kepolisian Negara Republik Indonesia No. 15 Tahun 2013. Tata Cara Penanganan Kecelakaan Lalu Lintas. *http://ditjenpp.kemenkumham.go.id/arsip/bn/2013/bn1528-2013.pdf* 01 April 2022 (09:36).

Putra, H. A., I. P. Hariyani and R. R. Akbar. 2022. Gambaran Pola Luka pada Kasus Kecelakaan Lalu Lintas di RSUD Mayjen H. A. Thalib Kerinci Periode 2018-2019. *Jurnal Kedokteran dan Kesehatan: Publikasi Ilmiah Fakultas Kedokteran Universitas Sriwijaya* 9(2): 207-211.

Ramadhani, R., Romadhona, N., Djojosugito, M., Hadiati, D. and Rukanta, D. 2019. Hubungan Jenis Kecelakaan dengan Tipe Fraktur pada Fraktur Tulang Panjang Ekstremitas Bawah. *Jurnal Integrasi Kesehatan & Sains* 1(1): 32-35.

Ratu, R. N. D. C., Pamuttu, A., Bension, J. B. 2021. Karkteristik dan Pola Luka

Korban Kecelakaan Lalu Lintas di Rumah Sakit Bhayangkara Ambon Periode 2014-2017. Molucca Medica 14(1): 65-83.

Riandini, I., Susanti, R., Yanis, A. 2015. Gambaran Luka Korban Kecelakaan Lalu Lintas yang Dilakukan Pemeriksaan di RSUP Dr. M. Djamil Padang. *J Kesehatan Andalas* 4: 502-508.

Saputra, A. 2017. Studi Tingkat Kecelakaan Lalu Lintas Jalan di Indonesia Berdasarkan Data KNKT (Komite Nasional Keselamatan Transportasi) Dari Tahun 2007-2016. *Warta Penelitian Perhubungan* 29(2):179-190.

Sharma, B. R. 2008. Road Traffic Injuries: A Major Global Public Health Crisis. *Public Health* 122(12): 13399-1406. PMID: 18950819

Susanti, R., Rusadi, A. R., Fortuna, F. 2021. Profile and Description of Injury Victims Died due to Traffic Accidents on Motorcycle Riders at the Forensic Section of Dr. RSUP M Djamil Padang Year 2018-2019. *Journal of Midwifery* 6(1).

Taufik, M., Alami, F. 2019. Angka Kecelakaan Lalu Lintas di Sidoarjo Tinggi dan Didominasi Motor, Ini Jumlahnya. *https://surabaya.tribunnews.com/2019/01/06/angka-kecelakaan-lalu-lintas-di-sidoarjo-tinggi-dan-didominasi-motor-ini-jumlahnya.* 29 March 2022 (18:47).

The Association of South East Asia Nation. *ASEAN Road Safety Startegy 2016.* Jakarta: Asean Secretariat, 2016

The Organization for Co-operation and Development (OEDC). 2014. Injuries in Road Traffic Accidents: Definition, Sources and Methods. *https://stats.oecd.org* 01 April 2022 (08:12).

Vara, K. *et al,.* 2021. Analisis Kecelakaan Lalu Lintas Studi Kasus Jalan Raya Pantura Tuban-Widang KM 0,00-KM 29,00. *Jurnal Bangunan* 26(1):45-62.

Yandi, T., F. Lubis and Winayati. 2020. Analisis Karakteristik Kecelakaan Lalu Lintas pada Jalan Yos Sudarso Kota Pekanbaru. *Jurnal Teknik* 14(1): 17-21.