Original article

Pattern of Injury and Outcome of Tok-Tok Accident Victims with Focus on Abdominal Injuries in Sohag Governorate: an Epidemiological Study

Ahmed M. Said[1], Emad G. Mohammed[2], Sara E. Kasem[1]

[1] Forensic medicine and clinical toxicology department, Sohag university. [2] General surgery department, Sohag university.

***Corresponding author**
Ahmed Mohamed Said, M.D.
Email:
ahmedabostate1981@gmail,com

ABSTRACT

Background: Road traffic accidents are one of the major causes of severe injuries and even death. Tok-Tok is a light weight, flexible and open vehicle designed to carry three adult passengers and a driver. Tok-Tok is one of the widely used means of transportation in Egypt nowadays. **Aim:** This study aimed to study the types and severity of the Tok-Tok accident-related injuries in Sohag Governorate. **Patients and Methods:** A Cross-sectional, hospital based study, done in Sohag University Hospitals from 1 January 2021 to 31 December 2021. The study included 100 victims who sustained Tok-Tok accidents. Data about victims were collected including demographic profile; accident data and clinical data. **Results:** The mean age of the study population was 34.3±15.4 years, and 2/3 of them were males. The driver of the Tok-Tok himself was the victim in 25% of the cases and the passenger in 39% of the cases. Rural victims accounted for 56% of the total cases. Among the drivers, only 28% had driving license, and around one third of them were drug addicts. The mean time lag between trauma and hospital arrival was around 1.25 hours. Regarding the injured parts of the victims, head and neck were the most commonly injured parts followed by upper limbs. Half of the cases treated conservatively. **Conclusion:** Tok-Tok accidents are more common among young and middle aged males at rural areas. The severity of Tok-Tok injuries are associated with head and neck trauma, need for surgical treatment and/or ICU admission and longer hospital stay.

Keywords: tok-tok, road traffic accidents

I. INTRODUCTION:

Road traffic accidents (RTA) are one of the major neglected causes of severe injuries and even death, especially in the developing countries **(Bandara, et al., 2012).**

Its injuries and fatalities are a vital public health issue that needs serious measures for effective control and prevention. Information from the Global status report on road safety 2015 about the total number of road traffic deaths from 180 countries, noted that it has plateaued at 1.25 million per year, with the highest fatality rates in low-income countries. Per 100,000 of population, the mortality rate for 2013 in Yemen was 15.17, 14 for Qatar and 13.2 for Egypt. However these rates are lower than reported in other countries as Iran (34.1), Iraq (31.5), Sudan (25.1), and Saudi Arabia (24.8) **(World Health O., 2015).**

In Egypt, several factors contribute to the exaggeration of the magnitude of the problem; such as poor infrastructure and quality of the majority of roads, the lack of regular road maintenance, and over-crowded traffic flows with trucks, pedestrians, motorcycles, buses, and motor vehicles all sharing the same road **(Fouda, et al., 2017).**

Auto tricycle (Three-wheeled motorcycle) known as "Tok-Tok" in Egypt is a light weight, flexible and open vehicle designed to carry three adult passengers and a driver. Tok-Tok is one of the widely used means of transportation in Egypt nowadays as they can easily reach the inaccessible city parts through narrow and poorly paved roads **(Sa and Mm, 2018).**

Furthermore, the high level of unemployment also made a lot of people to be Tok- Tok drivers because they are easy to drive and consume less fuel **(Salako, et al., 2013)**. Majority of them are young, without proper training, having no driving license and do not follow safety measures **(Omoke, et al., 2019).**

The risk of severe injury to the auto tricycle occupants is increased by being an open vehicle without safety device such as seat belt and airbag. The pedestrians hit by auto tricycle are also at risk of injury of varying degrees of severity depending on the orientation of the pedestrian on impact **(Chawla, et al., 2003)**.

Trauma scoring systems have been developed to evaluate the trauma severity and the prognosis after traumatic injury. The Injury Severity Score (ISS) is the most widely used anatomical scoring system for assessing the combined effect of multiple injuries and its value correlates with the risk of mortality **(Ebrahimi, et al., 2015)**.

Overall, there are a few researches conducted in Egypt that clarifies auto tricycle accidents pattern and outcome **(Hegazy, et al., 2020)**. Therefore, this study was conducted to assess pattern, injury severity level and factors associated with severity among auto tricycle "Tok-Tok" accident victims who attended Sohag University Hospitals over one year.

This study aimed to

1. Study the types and severity of the Tok-Tok accident-related injuries in Sohag Governorate
2. Evaluation of abdominal injuries among Tok-Tok victims.

II. PARTICIPANTS AND METHODS:

II.1 Study design:

A Cross-sectional, hospital based study.

II.2 Study location:

Surgical Emergency Unit of Sohag University Hospitals

II.3 Study time:

From 1 January 2021 to 31 December 2021 (one year study)

II.4 Subjects:

The study included 100 victims who sustained Tok-Tok accidents and were

admitted to Sohag University Hospitals during the period from the first of January to the end of December 2021.

Subjects who died before reaching the hospital; those with very mild negligible injuries were excluded from the current study.

Subjects were then divided into groups according to the type of victim (driver, passenger or other) according to the severity of trauma (minor, major) and according to the abdominal involvement of the injury. For each time, we compared the groups of the subjects according to the demographic and clinical data and the outcome of the injury.

II.5 Ethical considerations:

The study protocol was approved from the Local Ethical Committee of Sohag Faculty of Medicine, Sohag University.

IRB Registration number : Soh-Med-22-07-31

II.6 Methods:

Data about victims were collected including demographic profile (age, sex and residence); accident data (nature of the incident, type of injury and type of victim); clinical data (region of the body affected, type of lesion, severity of injury, treatment and outcome).

In addition, data about auto tricycle drivers was included as age, license, driving experience and working hours/ day. Drug screening for drivers was performed using Qualitative immunoassay test for detection of tramadol and cannabinoids.

Injury Severity Score (ISS) was used to determine the level of injury severity in the present study. ISS is an anatomical scoring system that provides an overall score for patients with multiple injuries consists of the squared. The ISS score takes values from 0 to 75 and correlates linearly with mortality, morbidity, hospital stay and other measures of severity. It was categorized and validated the ISS as follows; <9 = Mild, 9–15 = Moderate, 16-24 = Severe and ≥25 = Profound (Bolorunduro, et al., 2011). Major trauma is considered when ISS> 15 score **(Javali, et al., 2019 and Ali, et al., 2018).**

Accordingly, this study showed that injuries could be classified into major and minor trauma by an ISS cut-off value of 15 and the studied cases were categorized into two subgroups as with minor injury (ISS ≤ 15) and with major injury (ISS > 15).

Abdominal injuries were evaluated clinically and radiologically, to detect patients in need for surgical interference and others who needed just conservation.

II.7 Statistical analysis:

- Statistical package for social sciences (IBM-SPSS), version 25 (IBM-Corporation, Chicago, USA; August 2017) was used for statistical data analysis.
- Data was expressed as number and percentage and used as descriptive value for quantitative data.
- Pearson Chi square test was used to compare percentages of qualitative variables data.
- For all these tests, the level of significance (P-value) was explained as:
  - No significance P > 0.05
  - Significance P < 0.05
  - High significance P < 0.001.

III. RESULTS

A total of 100 Tok-Tok accident victims were included in the study. The mean age of the study population was around 34 years (range from 5-63 years); with around 40% of the cases were older than 40 years and only one quarter of them aged 20 years or less,

and two thirds of them were males. The driver of the Tok-Tok himself was the victim in 25% of the cases, the passenger in 39% and other (e.g. Pedestrians, passengers and drivers of other vehicles, etc.) in 36% of the cases. Rural victims accounted for 56% of the total cases (table 1).

Table 1. Demographic and clinical data of the study population

Item		No (%)
Age	< 20 years	24(24%)
	20-40 years	34(34%)
	>40 years	42(42%)
Sex	Male	66(66%)
	Female	34(34%)
Person injured	Driver	25(25%)
	Passenger	39(39%)
	Others	36(36%)
Residence	Urban	44(44%)
	Rural	55(56%)

Among the drivers, the mean age was 32.2 years; with more than one third of them aged <20 years (36%), all of them were males, more than two thirds were from rural areas (68%). Only 7 of them (28%) had driving license. The mean experience duration of the drivers was 4.8 years; with nearly half of them had experience of 4 years or less (44%), around half of them drive for more than 6 hours daily. Regarding drug addiction of the drivers, around one third of them were drug addicts (36%). Among them, 4 cases were tramadol addicts and 3 were cannabis addicts (table 2).

Table 2. Demographic and clinical data of the drivers

Item		Number/ (%)
Age	<20 years	9(36%)
	20-40 years	6(24%)
	>40 years	10(40%)
Sex	Male	25(100%)
	Female	0
Residence	Urban	8(32%)
	Rural	17(68%)
Driving license	Yes	7(28%)
	No	18(72%)
Experience (in years)	<4 years	11(44%)
	4-6 years	10(40%)
	>6 years	4(16%)
Daily driving hours	6	12(48%)
	9	7(28%)
	12	6(24%)
Drugs	Tramadol	4(16%)
	Cannabis	3(12%)
	Other	2(8%)

	Non	16(64%)

Regarding the collision, 23% of the accidents were due to hit to fixed object, bus; minibus or microbus in 17%, car and pedestrian in 15% each, motorcycle and bicycle (10% each), another toktok 8% and finally animals in 2% of the cases. Most of accidents occurred at the afternoon (73%), while morning accidents accounted for 18% of the cases and night for only 9% of the cases. The mean time lag between trauma and hospital arrival was around 1.25 hours, with time less than 60 minutes in 48% of the cases. Regarding the injured parts of the victims, head and neck were the most commonly injured parts (occurred in 55% of the cases); followed by upper limbs (41%), chest (29%), lower limbs (27%), and finally abdomen and pelvis (11%). Of course; multi-injured persons is not uncommon with many of the cases has at least two parts injured at the same time. Regarding the ISS scoring, minor trauma was the condition in 75% of the cases (mild in 15% and moderate in 60%), while major trauma in the remaining 25% (severe trauma in 22% of the cases and profound in 3% of the cases. Half of the cases treated conservatively (50%) and the other half needed surgical intervention. The hospital stay of the cases ranged from 1-13 days, with the majority of cases stayed more than 5 days (64%). 15 cases (15%) needed ICU admission and among them 9 cases needed ventilation (table 3).

Regarding the comparison of the demographic and clinical data according to the type of victims, the only significant differences seen were age (where 36% of the drivers were younger than 20 years, compared to only 18% among passengers or 22% among others) and sex (where all of the drivers were males, while around half of the other victims were females (p value <0.001). although more drivers were from rural areas compared to other victims; the difference was non significant. The incidence of major trauma among drivers was lower among drivers (16%) compared to passengers (25.6%) or others (30.6%); but also with a non significant difference (table 4).

Regarding the comparison of the demographic and clinical data according to the severity of trauma, the significant differences seen were head and neck trauma (seen in 88% of the major trauma cases, compared to only 44% of the minor trauma ones); surgical treatment (needed for 84% of the major trauma cases and 38.7% of the minor trauma cases); hospital stay (with 24% of the cases with major trauma stayed for more than 10 days, compared to zero among those with minor trauma) and finally the need for ICU and ventilation (seen in 56% and 36% of the major trauma cases; compared to only 1.3% and zero among the minor trauma cases; respectively) (table 5).

Regarding the demographic and clinical data according to the presence or absence of abdominal/pelvic injuries, we found non significant differences between cases with abdominal or pelvic injuries and those without as regards demographic data. Regarding the clinical comparison, cases with abdominal injuries showed significantly lower incidence of head and neck or upper limb injuries, less mean ISS score and less hospital stay duration. This is because most of the cases with abdominal or pelvic injuries had only mild cutaneous or subcutaneous

injuries, and 9 out of the 11 cases treated conservatively; with lesions such as skin abrasion (figure 1); hematoma (figure 2) and lacerations (figure 3), with only two cases needed abdominal exploration; one due to mesenteric injury (figure 4) and the other due to intestinal injury (figure 5). Table 6 summarize the data of these 11 cases and table 7 compare the data of these 11 cases with the remaining 89 cases with no abdominal injuries.

Table 3. Trauma data of the study population

Item		Number (%)
Collision	Car	15(15%)
	Bus/Minibus/Microbus	17(17%)
	Toktok	8(8%)
	Motorcycle	10(10%)
	Bicycle	10(10%)
	Pedestrian	15(15%)
	Fixed Object	23(23%)
	Animal	2(2%)
Time at accident	Morning	18(18%)
	Afternoon/evening	73(73%)
	Night	9(9%)
Time from accident to hospital (in minutes)	<30 minutes	17(17%)
	30-60 minutes	31(31%)
	1-2 hours	42(42%)
	2-3 hours	10(10%)
Site of trauma	Head/neck	55(55%)
	Chest	29(29%)
	Abdomen/pelvis	11(11%)
	Upper limbs	41(41%)
	Lower limbs	27(27%)
ISS	Mild	15(15%)
	Moderate	60(60%)
	Severe	22(22%)
	Profound	3(3%)
Severity	Minor trauma	75(75%)
	Major trauma	25(25%)
Treatment	Conservative	50(50%)
	Surgical	50(50%)
Hospital stay in days	1-5 days	36(36%)
	6-10 days	58(58%)
	10-13 days	6(6%)
ICU admission		15(15%)
Ventilation		9(9%)

Table 4. Comparison of the demographic and clinical data according to the type of victims

Item		Type of the victim (number/ %)			P value
		Driver	Passenger	Other	
Age	<20 years	9(36%)	7(17.9%)	8(22.2%)	0.032
	20-40 years	6(24%)	20(51.3%)	8(22.2%)	
	>40 years	10(40%)	12(30.8%)	20(55.6%)	
Sex	Male	25(100%)	23(59%)	18(50%)	<0.001
	Female	0	16(41%)	18(50%)	
Residence	Urban	8(32%)	19(48.7%)	17(47.2%)	0.374
	Rural	17(68%)	20(51.3%)	19(52.8%)	
Collision	Car	3(12%)	7(17.9%)	5(13.9%)	0.859
	Bus/Minibus/Microbus	6(24%)	6(15.4%)	5(13.9%)	
	Toktok	4(16%)	2(5.1%)	2(5.6%)	
	Motorcycle	2(8%)	4(10.3%)	4(11.1%)	
	Bicycle	1(4%)	4(10.3%)	5(13.9%)	
	Pedestrian	3(12%)	5(12.8%)	7(19.4%)	
	Fixed Object	5(20%)	11(28.2%)	7(19.4%)	
	Animal	1(4%)	0	1(2.8%)	
Time at accident	Morning	5(20%)	6(15.4%)	7(19.4%)	0.410
	Afternoon/evening	17(68%)	32(82.1%)	24(66.7%)	
	Night	3(12%)	1(2.6%)	5(13.9%)	
Time from accident to hospital (in minutes)	<30 minutes	4(16%)	7(17.9%)	6(16.7%)	0.643
	30-60 minutes	6(24%)	10(25.6%)	15(41.7%)	
	1-2 hours	12(48%)	19(48.7%)	11(30.6%)	
	2-3 hours	3(12%)	3(7.7%)	4(11.1%)	
Site of trauma	Head/neck	15(60%)	20(51.3%)	20(55.6%)	0.789
	Chest	7(28%)	13(33.3%)	9(25%)	0.723
	Abdomen/pelvis	3(12%)	6(15.4%)	2(5.6%)	0.390
	Upper limbs	9(36%)	18(46.2%)	14(38.9%)	0.686
	Lower limbs	9(36%)	9(23.1%)	9(25%)	0.495
ISS	Mild	6(24%)	3(7.7%)	6(16.7%)	0.515
	Moderate	15(60%)	26(66.7%)	19(52.8%)	
	Severe	3(12%)	9(23.1%)	10(27.8%)	
	Profound	1(4%)	1(2.6%)	1(2.8%)	
Severity	Minor trauma	21(84%)	29(74.4%)	25(69.4%)	0.431
	Major trauma	6(16%)	10(25.6%)	11(30.6%)	
Treatment	Conservative	14(56%)	18(46.2%)	18(50%)	0.744
	Surgical	11(44%)	21(53.8%)	18(50%)	
Hospital stay (in days)	1-5 days	12(48%)	10(25.6%)	14(38.9%)	0.093
	6-10 days	13(52%)	27(69.2%)	18(50%)	
	11-13 days	0	2(5.2%)	4(11.1%)	
ICU admission		2(8%)	6(15.4%)	7(19.4%)	0.467
Ventilation		1(4%)	4(10.3%)	4(11.1%)	0.596

Pearson Chi square was used

Table 5. Comparison of the demographic and clinical data according to the severity of trauma

Item		Type of trauma (number/ %)		P value
		Minor	Major	
Age	<20 years	15(20%)	9(36%)	0.166
	20-40 years	25(33.3%)	9(36%)	
	>40 years	35(46.7%)	7(28%)	
Sex	Male	50(66.7%)	16(64%)	0.807
	Female	24(33.3%)	9(36%)	
Residence	Urban	35(46.7%)	9(36%)	0.352
	Rural	40(53.3%)	16(64%)	
Victim	Driver	21(28%)	4(16%)	0.431
	Passenger	29(38.7%)	10(40%)	
	Other	25(33.3%)	11(44%)	
Collision	Car	11(14.7%)	4(16%)	0.535
	Bus/Minibus/Microbus	16(21.3%)	1(4%)	
	Toktok	5(6.7%)	3(12%)	
	Motorcycle	6(8%)	4(16%)	
	Bicycle	7(9.3%)	3(12%)	
	Pedestrian	11(14.7%)	4(16%)	
	Fixed Object	17(22.7%)	6(24%)	
	Animal	2(2.7%)	0	
Time at accident	Morning	15(20%)	3(12%)	0.312
	Afternoon/evening	54(72%)	19(76%)	
	Night	6(8%)	3(12%)	
Time from accident to hospital (in minutes)	<30 minutes	13(17.3%)	4(16%)	0.929
	30-60 minutes	22(29.3%)	9(36%)	
	1-2 hours	32(42.7%)	10(40%)	
	2-3 hours	8(10.7%)	2(8%)	
Site of trauma	Head/neck	33(44%)	22(88%)	**<0.001**
	Chest	18(24%)	11(44%)	0.056
	Abdomen/pelvis	11(14.7%)	0	0.061
	Upper limbs	33(44%)	8(32%)	0.291
	Lower limbs	21(28%)	6(24%)	0.696
ISS	Mild	15(20%)	0	**<0.001**
	Moderate	60(80%)	0	
	Severe	0	22(88%)	
	Profound	0	3(12%)	
Treatment	Conservative	46(61.3%)	4(16%)	**<0.001**
	Surgical	29(38.7%)	21(84%)	
Hospital stay in days	1-5 days	35(46.7%)	1(4%)	**<0.001**
	6-10 days	40(53.3%)	18(72%)	
	11-13 days	0	6(24%)	
ICU admission		1(1.3%)	14(56%)	**<0.001**
Ventilation		0	9(36%)	**<0.001**

Pearson Chi square was used.

Table 6. demographic and clinical data of the 11 cases with abdominal injuries

Item			No(%)
Age	<20 years		1(9.1%)
	20-40 years		7(63.6%)
	>40 years		3(27.3%)
Sex	Male		7(63.6%)
	Female		4(36.4%)
Residence	Urban		7(63.6%)
	Rural		4(36.4%)
Victim	Driver		3(27.3%)
	Passenger		6(54.5%)
	Other		2(18.2%)
Collision	Car		2(18.2%)
	Bus/Minibus/Microbus		(9.1%)
	Toktok		(9.1%)
	Motorcycle		(9.1%)
	Bicycle		(9.1%)
	Pedestrian		(9.1%)
	Fixed Object		4(36.4%)
	Animal		0
Time at accident	Morning		2(18.2%)
	Afternoon/evening		9(81.8%)
	Night		0
Time from accident to hospital (in minutes)	<30 minutes		3(27.3%)
	30-60 minutes		2(18.2%)
	1-2 hours		6(54.5%)
	2-3 hours		0
ISS	Mild		4(36.4%)
	Moderate		7(63.6%)
	Severe		0
	Profound		0
Nature of injury	Abdominal wall injury	Abrasions	2(18.2%)
		Hematoma	1(9.1%)
		Lacerations	1(9.1%)
	Liver contusions		2(18.2%)
	Splenic contusions		1(9.1%)
	Liver laceration		1(9.1%)
	Retroperitoneal hematoma		1(9.1%)
	Mesenteric injury		1(9.1%)
	Intestinal injury		1(9.1%)
Treatment	Conservative		9(81.8%)
	Surgical		2(18.2%)
Indication for surgery	Mesenteric injury		1(9.1%)
	Intestinal injury		1(9.1%)
Hospital stay in days	1-5 days		6(54.5%)
	6-10 days		5(45.5%)
	11-13 days		0
ICU admission			0
Ventilation			0

Table 7. Comparison of the demographic and clinical data according to the presence or absence of abdominal injury

Item		Abdominal Injury		P value
		Yes(n=11)	No(n-89)	
Age	<20 years	1(9.1%)	23(25.8%)	0.083
	20-40 years	7(63.6%)	27(30.3%)	
	>40 years	3(27.3%)	39(43.8%)	
Sex	Male	7(63.6%)	59(66.3%)	0.861
	Female	4(36.4%)	30(33.7%)	
Residence	Urban	7(63.6%)	37(41.6%)	0.164
	Rural	4(36.4%)	52(58.4%)	
Victim	Driver	3(27.3%)	22(24.7%)	0.390
	Passenger	6(54.5%)	33(37.1%)	
	Other	2(18.2%)	34(38.2%)	
Collision	Car	2(18.2%)	13(4.6%)	0.956
	Bus/Minibus/Microbus	(9.1%)	16(18%)	
	Toktok	(9.1%)	7(7.9%)	
	Motorcycle	(9.1%)	9(10.1%)	
	Bicycle	(9.1%)	9(10.1%)	
	Pedestrian	(9.1%)	14(5.7%)	
	Fixed Object	4(36.4%)	19(21.3%)	
	Animal	0	2(2.2%)	
Time at accident	Morning	2(18.2%)	16(18%)	0.537
	Afternoon/evening	9(81.8%)	64(71.9%)	
	Night	0	9(10.1%)	
Time from accident to hospital (in minutes)	<30 minutes	3(27.3%)	14(15.7%)	0.243
	30-60 minutes	2(18.2%)	29(32.6%)	
	1-2 hours	6(54.5%)	36(40.4%)	
	2-3 hours	0	10(11.2%)	
Site of trauma	Head/neck	0	55(61.8%)	**<0.001**
	Chest	3(27.3%)	26(29.2%)	0.894
	Upper limbs	1(9.1%)	40(44.9%)	**0.023**
	Lower limbs	3(27.3%)	24(27%)	0.983
ISS	Mild	4(36.4%)	11(12.4%)	0.076
	Moderate	7(63.6%)	53(59.6%)	
	Severe	0	22(24.7%)	
	Profound	0	3(3.4%)	
Treatment	Conservative	9(81.8%)	41(46.1%)	0.051
	Surgical	2(18.2%)	48(53.9%)	
Hospital stay in days	1-5 days	6(54.5%)	30(33.7%)	0.247
	6-10 days	5(45.5%)	53(59.6%)	
	11-13 days	0	6(6.7%)	
ICU admission		0	15(16.9%)	0.209
Ventilation		0	9(10.1%)	0.592

Pearson Chi square was used.

Figure 1. Abrasions of anterior abdominal wall caused by Toktok trauma

Figure 2. Abdominal wall hematoma caused by Toktok trauma

Figure 3. Lacerated abdominal wall wound

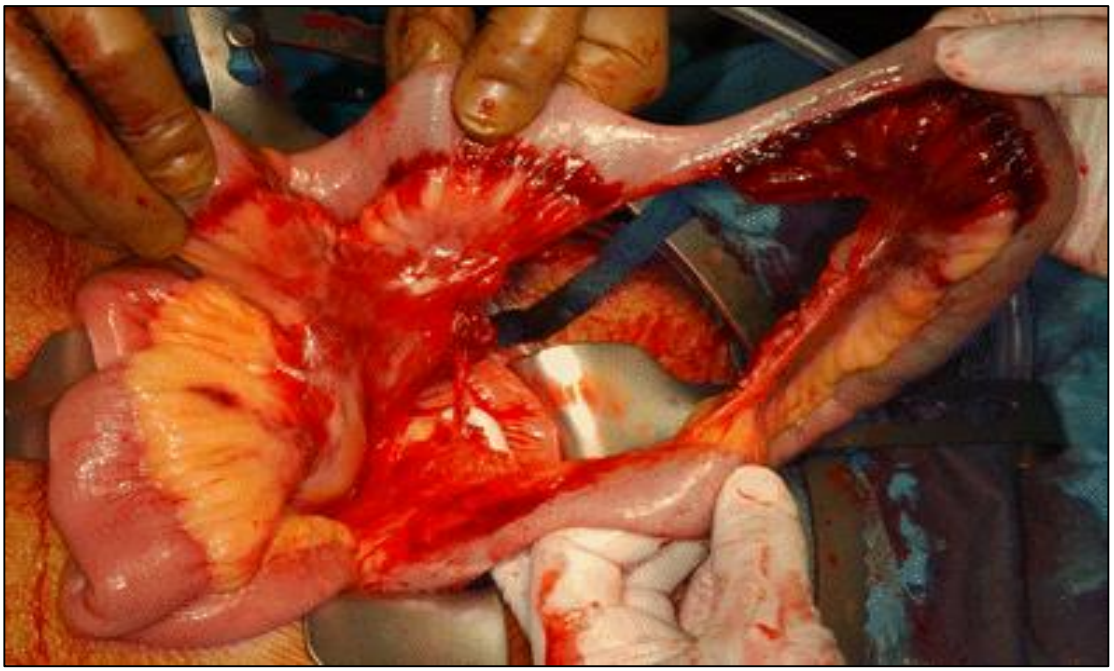

Figure 4. Mesenteric injury due to blunt abdominal trauma caused by Toktok trauma

Figure 5. Intestinal injury

IV. DISCUSSION

Auto tricycle is a common means of public transport in Egypt due to their economic and physical feasibility compared to other means of transportation. Also, the high level of unemployment made a lot of people to work as drivers for motorcycle taxis "Tok-Tok" **(Salako, et al., 2013)**.

The current study aimed to study the types and severity of the Tok-Tok accident-related injuries in Sohag Governorate.

The study included 100 victims who sustained Tok-Tok accidents and were admitted to Sohag University Hospitals during the period from the first of January to the end of December 2021. Subjects who died before reaching the hospital; those with very mild negligible injuries and those who refused to be included in the study were excluded from the current study.

The mean age of the study population was 34.3±15.4 years. Most of the cases were in the middle aged group (20-40 years) which is consistent with other studies in Egypt and other developing countries (1, 6, 13, 14) as this age was more involved in work activities. The involvement of older age groups in traffic related injuries were noted in the more developed countries. This difference was most likely related to longevity in these countries **(World Health O., 2015).**

Two thirds of the current study cases were males. This male predominance was similar to (**Hegazy et al., 2020)** and **(Omoke et al., 2019)** where 77.3% and 67.1% of victims were males as being more involved in outdoor works and commonly exposed to accidents.

More than half of the cases were from rural areas, which is less manifest compared to the study of (**Hegazy et al., 2020)** where most of the cases came from rural areas. This rural predominance both in Sohag and Menofeya was due to both governorates were rural ones, and also the streets in rural areas are mostly narrow with low quality, poor illumination and lack of traffic signs **(de Oliveira and de souse, 2011).** Also, people from rural areas need to travel to cities for different purposes as working, learning and buying their needs **(Sing, et al., 2016).**

The driver of the Tok-Tok himself was the victim in 25% of the cases, the passenger in 39% and other (e.g. Pedestrians, passengers and drivers of other vehicles, etc.) in 36% of the cases. In the study of **(Hegazy et al., 2020)**; passengers constituted 44% of the victims; which was also similar to **(Shalaby et al., 2010)**. This means that passengers and pedestrians were the most commonly injured victims in Tok-Tok accidents. The risk for passengers specially is high due to the higher exposure as it is an open vehicle without doors or seat belt. Also, one vehicle transports more than one passenger so, one crash injured many passengers.

Among the drivers, the mean age was 32.2±16.5 years (range 11-60 years), all of them were males, more than two thirds were from rural areas (68%). Only 7 of them (28%) had driving license. The mean experience duration of the drivers was 4.8±1.7 years (ranged from 2-9 years), around half of them drive for more than 6 hours daily. Regarding drug addiction of the drivers, around one third of them were drug addicts (36%). Among them, 4 cases were tramadol addicts and 3 were cannabis addicts. In the study of **(Hegazy et al., 2020**) most of drivers did not have license (73%) and with driving experience < 5 years, and more than 90% of them work more than 8 daily driving hours. Also, they reported that nearly half of the drivers were less than 18 years old and more than one quarter (27.3%) of them had positive screening for tramadol and cannabis at the time of accidents. **(Chalya et al., 2010)** reported that motorcycle injuries accounted for more than fifty percent of road traffic injuries that might be attributed to negligence of the driver, poor maintenance of vehicles,

driving under the influence of alcohol or drugs and disregard of traffic laws. **(Hegazy et al., 2020**) reported that the less experience of the drivers; the more the risk of accidents. These results were contrary to the study of **(Shrestha et al., 2017)** who revealed that increased year of experience of driver was associated with RTAs due to carelessness behavior of the driver. The study of **(Shaker et al., 2014)** found that among motorcycle accident riders; 21% were drug addicts.

Regarding the collision, 23% of the accidents were due to hit to fixed object, bus; minibus or microbus in 17%, car and pedestrian in 15% each, motorcycle and bicycle (10% each) and finally animals in 2% of the cases. This was somewhat similar to the study of **(Hegazy et al., 2020**). This might be due to a considerable number of drivers aged less than 18 years with poor driving experience. However, our study was different from (**Schmucker et al., 2011)** who reported that collision with single-vehicle was the commonest type.

Most of accidents occurred at the afternoon (73%), while morning accidents accounted for 18% of the cases and night for only 9% of the cases. This was similar to **(Hegazy et al., 2020**) and **(Sing, et al., 2016)**. The possible causes of this may be the tired drivers after a long daytime working or the hurry to get back to home after work completion for both the driver, the passenger or ever the pedestrians. However, our study was different from the study of **(Shrestha et al., 2017)** in Nepal as most accidents developed in the foggy morning time which reduces the vision on the road. According to **(Omoke, et al., 2019)**, 40% of the accidents occurred at night time, while 60% occurred at daytime.

The mean time lag between trauma and hospital arrival was around 1.25 hours (78.6±41.5 minutes). According to **(Hegazy et al., 2020**) nearly half of the cases arrived at hospital within one to less than two hours from the accident.

Regarding the injured parts of the victims, head and neck were the most commonly injured parts (occurred in 55% of the cases); followed by upper limbs (41%), chest (29%), lower limbs (27%), and finally abdomen and pelvis (11%). Of course; multi-injured persons is not uncommon with many of the cases has at least two parts injured at the same time. This was different from the study of **(Hegazy et al., 2020**) who stated that the extremities (48.0%) followed by head and neck injuries (40.3%) were the most affected areas in the studied cases. They also found that abdominal/pelvic injuries occurred in a minority of their cases (14.7%). Also, **(Omoke, et al., 2019)** found that the lower extremity (50%), head (38.6%) and upper extremity (30.4%) were the three most commonly involved regions.

Regarding the ISS scoring, minor trauma was the condition in 75% of the cases (mild in 15% and moderate in 60%), while major trauma in the remaining 25% (severe trauma in 22% of the cases and profound in 3% of the cases. This was somewhat worse that the findings in the study of **(Omoke, et al., 2019)**, who found that over 60% of their cases had mild ISS score, around 25% had moderate ISS score, and only around 12% of their cases had severe ISS score.

Half of the cases treated conservatively (50%) and the other half needed surgical intervention. The findings of (**Ibeanusi and Diamond 2018)** in Nigeria showed similar results to our study with around half of the cases treated conservatively. In the study of **(Hegazy et al., 2020**); 69.3% of the cases had mild and moderate injuries having an ISS ≤15 and more than half of the cases (54.7%) didn't need surgical interference. Also, the study of **(Omoke, et al., 2019)** stated that around two thirds of the cases were treated conservatively.

The hospital stay of the cases ranged from 1-13 days (with a mean of 6.5±2.8 days). Our cases showed less range and higher mean duration of hospital stay compared to **(Hegazy et al., 2020**) who reported that the hospital stay for their cases ranged from 1 to 21 days with an average of 5 days.

Fifteen cases (15%) needed ICU admission and among them 9 cases needed ventilation. This was better than the study of **(Hegazy et al., 2020**), where about one quarter of the cases (24.4%) was admitted to ICU. According to **(Chalya et al., 2010)**, road traffic crushes are commonest cause of ICU trauma admissions in most studies.

Regarding the comparison of the demographic and clinical data according to the type of victims, the only significant differences seen were age (with younger age groups seen more among drivers) sex (where all of the drivers were males, while around half of the other victims were females (p value <0.001). although more drivers were from rural areas compared to other victims; the difference was non significant. The incidence of major trauma among drivers was lower among drivers (16%) compared to passengers (25.6%) or others (30.6%); but also with a non significant difference. In the study of **(Hegazy et al., 2020**), limb injuries were more in pedestrians and motorcyclist.

Regarding the comparison of the demographic and clinical data according to the severity of trauma, the significant differences seen were head and neck trauma (seen in 88% of the major trauma cases, compared to only 44% of the minor trauma ones); surgical treatment (needed for 84% of the major trauma cases and 38.7% of the minor trauma cases); hospital stay (with a mean of around 9 days among major trauma cases and compared to only 5.5 days of the major trauma ones) and finally the need for ICU and ventilation (seen in 56% and 36% of the major trauma cases; compared to only 1.3% and zero among the minor trauma cases; respectively). According to the study of **(Hegazy et al., 2020**), major injuries (ISS>15) was associated with younger age (< 20 years), head and neck injuries, prolonged duration of hospital stay, surgical treatment and ICU admission. Also, **(Moore et al., 2014)** revealed that the injury severity was associated with the length of hospital stay in Canada.

Regarding the demographic and clinical data of the 11 cases with abdominal/pelvic injuries, we found non significant differences between these cases and the remaining 89 cases as regards demographic and data, with exception of having lower incidence of head and neck or upper limb injuries, less mean ISS score and less hospital stay duration. This is because 9 out of these 11 cases had only mild cutaneous or subcutaneous injuries (abrasions, subcutaneous hematomas and/or lacerations), and only two cases needed abdominal exploration; one due to mesenteric injury and the other due to intestinal injury. This is not similar to the study of **(Hegazy et al., 2020**), who reported a higher ISS score among cases with abdominal and pelvic injuries. This difference may be in part due to the higher number of the total cases in their study (2030 cases compared to 100 in the current study); the more multiplicity of trauma among their cases and that they included only cases with intra-abdominal organ trauma and not only those with cutaneous or subcutaneous injuries.

V. Conclusion:

Tok-Tok accidents are more common among young and middle aged males at rural areas. The severity of Tok-Tok injuries are associated with head and neck trauma, need for surgical treatment and/or ICU admission and longer hospital stay. Drug addiction, younger age, less experience and longer working hours of the drivers were associated with increased risk for Tok-Tok accidents. Abdominal and pelvic injures among Tok-tok

victims tends to be of lower incidence and lower severity compared to head and neck or peripheral injuries, but some cases may had massive intra-abdominal insults requiring surgical intervention and abdominal exploration.

VI. Recommendations

a. Increasing doctors' awareness of the types of injuries in tok-tok accidents and how to deal with them
b. Prohibition of driving a tok-tok without a driver's license
c. Do periodic drug tests for all tok-tok drivers

VII. Conflicts of interest

The author declared that there was no conflict of interest.

VIII. References:

Ali Ali B, Lefering R, Fortun Moral M, Belzunegui Otano T. Mortality in severe trauma patients attended by emergency services in Navarre, Spain: validation of a new prediction model and comparison with the Revised Injury Severity Classification Score II. Emergencias. 2018;30(2):98-104.

Bandara K, Vadysinghe AN, Edussuriya DH. Medico legal aspects of injuries sustained by occupants of three wheelers in road traffic crashes. Science. 2012.

Bolbol S, Zalat M. Motorcycle riders'risky behaviors and safety measures: a hospital-based study. Egyptian Journal of Occupational Medicine. 2018;42(3):453-68.

Bolorunduro OB, Villegas C, Oyetunji TA, Haut ER, Stevens KA, Chang DC, et al. Validating the Injury Severity Score (ISS) in different populations: ISS predicts mortality better among Hispanics and females. The Journal of surgical research. 2011;166(1):40-4.

Chalya PL, Mabula JB, Ngayomela IH, Kanumba ES, Chandika AB, Giiti G, et al. Motorcycle injuries as an emerging public health problem in Mwanza City, Tanzania: A call for urgent intervention. Tanzania Journal of Health Research. 2010;12(4):214-21.

Chawla A, Mukherjee S, Mohan D, Singh J, Rizvi N. Crash simulations of three wheeled scooter taxi (tst). Indian Institute of Technology. 2003.

de Oliveira NLB, de Sousa RMC. Traffic accidents with motorcycles and their relationship to mortality. Revista latino-americana de enfermagem. 2011;19(2):403-10.

Ebrahimi M, Pirazghandi H, Reihani HR. How is the injury severity scored? a brief review of scoring systems. Reviews in Clinical Medicine. 2015;2(3):125-8.

Fouda EY, Youssef M, Emile SH, Elfeki H, Thabet W, Abdallah E, et al. Pattern of major injuries after motorcycle accidents in Egypt: The Mansoura Emergency Hospital experience. Trauma. 2017;19(1):39-45.

Hegazy MM, Slima SR, Medicine F, Hegazy MM. Pattern and injury severity of auto tricycle "Tok-Tok" vehicles' accidents: one year prospective study. The Egyptian Journal of Forensic Sciences and Applied Toxicology. 2020;20(4):55-71.

Ibeanusi SE, Diamond TE. Traffic related injuries from a trauma registry: Pattern and outcome. Nigerian Journal

of Orthopaedics and Trauma. 2018;17(1):22.

Javali RH, Krishnamoorthy, Patil A, Srinivasarangan M, Suraj, Sriharsha. Comparison of Injury Severity Score, New Injury Severity Score, Revised Trauma Score and Trauma and Injury Severity Score for Mortality Prediction in Elderly Trauma Patients. Indian J Crit Care Med. 2019;23(2):73-7.

Mansuri FA, Al-Zalabani AH, Zalat MM, Qabshawi RI. Road safety and road traffic accidents in Saudi Arabia. A systematic review of existing evidence. Saudi medical journal. 2015;36(4):418-24.

Moore L, Stelfox HT, Turgeon AF, Nathens A, Bourgeois G, Lapointe J, et al. Hospital length of stay after admission for traumatic injury in Canada: a multicenter cohort study. Annals of surgery. 2014;260(1):179-87.

Omoke NI, Lasebikan OA, Onyemaechi NO, Ajali N. Auto tricycle injuries and the vulnerability of occupants and pedestrians in a developing Country: A multi-center study. Nigerian journal of clinical practice. 2019;22(7):971-6.

Sa B, Mm Z. MOTORCYCLE RIDERS'RISKY BEHAVIORS AND SAFETY MEASURES: A HOSPITAL-BASED STUDY. Egyptian Journal of Occupational Medicine. 2018;42(3):453-68.

Salako A, Abiodun O, Sholeye O. Risk behaviors for road traffic accidents and severe crash injuries among commercial motorcyclists in Sagamu, South West, Nigeria. Online Journal of Medicine and Medical Science Research. 2013;2(2):19-23.

Schmucker U, Dandona R, Kumar GA, Dandona L. Crashes involving motorised rickshaws in urban India: characteristics and injury patterns. Injury. 2011;42(1):104-11.

Shaker RH, Eldesouky RS, Hasan OM, Bayomy H. Motorcycle crashes: attitudes of the motorcyclists regarding riders' experience and safety measures. Journal of community health. 2014;39(6):1222-30.

Shalaby SA, Akeed YA, Fawzi MM, Nabil DM. Prospective study of some medico-legal aspects of road traffic accidents (RTAs) in Great Cairo 2007. International journal of academic research. 2010;2(2).

Shrestha VL, Bhatta DN, Shrestha KM, Krishna Bahadur GC, Paudel S. Factors and pattern of injuries associated with road traffic accidents in hilly district of Nepal. Journal of Biosciences and Medicines. 2017;5(12):88.

Singh D, Singh SP, Kumaran M, Goel S. Epidemiology of road traffic accident deaths in children in Chandigarh zone of North West India. Egyptian journal of forensic sciences. 2016;6(3):255-60.

World Health O. Global status report on road safety 2015: World Health Organization; 2015.

الملخص العربي

نمط إصابة ونتائج متضرري حوادث التوك توك بمحافظة سوهاج: دراسة وبائية

د. احمد محمد سعيد [1]،د. عماد جمعة محمد[2]، د. سارة السيد قاسم[1]
[1] قسم الطب الشرعى و السموم . جامعه سوهاج. [2]قسم الجراحة العامة . جامعه سوهاج

المقدمة: تعتبر حوادث المرور من الأسباب الرئيسية للإصابات الخطيرة وحتى الوفاة. يعد التوك توك مركبة خفيفة الوزن ومرنة ومفتوحة مصممة لنقل ثلاثة ركاب بالغين وسائق، كما يعد التوك توك إحدى وسائل النقل المستخدمة على نطاق واسع في مصر في الوقت الحاضر. **الهدف:** هدفت هذه الدراسة إلى دراسة أنواع وشدة الإصابات الناجمة عن حوادث التوكتوك في محافظة سوهاج. **المرضى وطرق البحث:** دراسة مقطعية أجريت في مستشفيات سوهاج في الفترة من 1 يناير 2021 إلى 31 ديسمبر 2021. وشملت الدراسة 100 ضحية تعرضوا لحوادث توك توك. تم جمع البيانات حول الضحايا بما في ذلك البيانات الديموغرافية، وبيانات الحوادث والبيانات السريرية. **النتائج:** كان متوسط اعمار المصابين الذين شملتهم الدراسة 34.3 ± 15.4 سنة ، وكان ثلثاهم من الذكور. سائق التوك توك نفسه كان الضحية في 25٪ من الحالات والراكب في 39٪ من الحالات. وبلغت نسبة الضحايا في الريف 56٪ من إجمالي الحالات. من بين السائقين وجد أن 28٪ فقط لديهم رخصة قيادة ، وحوالي ثلثهم من مدمني المخدرات. كان متوسط الفاصل الزمني بين الحادث والوصول إلى المستشفى حوالي 1.25 ساعة. وفيما يتعلق بالأجزاء المصابة من الضحايا ، كان الرأس والرقبة أكثر الأجزاء المصابة تليها الأطراف العلوية. تم علاج نصف الحالات بشكل تحفظي دون الحاجة للتدخل الجراحي. **الخلاصة:** إن حوادث التوك توك أكثر شيوعًا بين الشباب ومتوسطي العمر من الذكور في المناطق الريفية. كما ترتبط شدة إصابات توك توك بصدمات الرأس والرقبة والحاجة إلى العلاج الجراحي و / أو دخول وحدة العناية المركزة والإقامة الأطول في المستشفى.