

Original article

Associated factor related to head injury from road traffic injury at Thaluang Hospital, Thailand

Pongpisut Thakhampaeng¹, Ingprapha Yenying², Sirada Tangpanitansook² and Ram Rangsin¹

¹Department of Military and Community Medicine, Phramongkutklao College of Medicine; ²Department of Medicine, Phramongkutklao Hospital

Abstract:

Background: Road traffic accident is one of the major problems around the world causing death and handicap. Thaluang district has the second highest number of road traffic accidents in Lopburi province. Road traffic accidents are also the most common visit cases in the emergency department at Thaluang Hospital. Therefore, the traffic safety campaign was started in Thaluang district. However, the number of injury and death from road traffic injury is still high. There is still limited evidence on associated factors related to head injury in road traffic injury. **Methods:** This is a retrospective cross-sectional 3-year study of road traffic injured patients attending a first-level referral (F2) hospital, Thaluang Hospital, in Lopburi province, Thailand from January 2016 to December 2018. We included patients who suffered from road traffic injury in Thaluang district area and visited Thaluang Hospital. Data was collected using road traffic injury online records of Lopburi province. Finally, the data was analysed by SPSS version 22. **Results:** A total of 1,117 patients were included in this study. The overall prevalence of head injury from road traffic injury at Thaluang Hospital is 11.1%. The factors including not following safety protocols (odds ratio 5.39, 95%CI: 1.02-28.63), and not following the law (odds ratio 7.56, 95%CI: 1.42-40.26), were statistically associated with head injury from road traffic injury by analysis using multiple logistic regression analysis. **Conclusion:** The overall prevalence of head injury from road traffic injury at Thaluang Hospital is persistently high over a 3-year period. It is significantly associated with not following safety protocols and not following the law. Therefore, despite continuing campaign for more than three years, we suggested that the campaign should still be emphasized more about wearing a helmet, wear a safety belt, and encouraging people to follow the law. This research can be adapted for Thailand to set a new intervention to reduce accidents in the future.

Keywords: ● Road traffic injury ● Head injury ● Associated factors ● Thailand

RTA Med J 2023;76(4):145-53.

Received 25 October 2023 Corrected 4 November 2023 Accepted 2 December 2023

Correspondence should be addressed to Capt. Pongpisut Thakhampaeng, MD., Department of Military and Community Medicine, Phramongkutklao College of Medicine, Bangkok 10400

นิพนธ์ต้นฉบับ

Associated factor related to head injury from road traffic injury at Thaluang Hospital, Thailand

พงศ์พิสุทธิ์ ทาคำแปง¹ อิงค์ประภา เียนยั้ง² ศิริดา ตั้งปณิธานสุข² และ ราม รั้งสินธุ์¹

¹ภาควิชาเวชศาสตร์ทหารและชุมชน วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า ²กองอายุรกรรม โรงพยาบาลพระมงกุฎเกล้า

บทคัดย่อ

ความเป็นมาและวัตถุประสงค์ ปัญหาอุบัติเหตุการจราจรเป็นปัญหาสำคัญของโลกที่ก่อให้เกิดการเสียชีวิต และพิการเป็นจำนวนมาก โดยพื้นที่อำเภอท่าหลวงพบอุบัติเหตุการจราจรบ่อยเป็นอันดับสองของจังหวัดลพบุรี และเป็นสาเหตุสำคัญของการรักษาในโรงพยาบาล จึงได้ริเริ่มรณรงค์ความปลอดภัยการจราจรในอำเภอท่าหลวง อย่างไรก็ตามจำนวนผู้บาดเจ็บและเสียชีวิตจากอุบัติเหตุทางถนนยังคงมีสูง ยังมีข้อมูลที่ยังขาดเกี่ยวกับปัจจัยที่เกี่ยวข้องกับการบาดเจ็บที่ศีรษะจากอุบัติเหตุการจราจรบนท้องถนน **รูปแบบงานวิจัย** การศึกษาแบบภาคตัดขวางย้อนหลังของผู้บาดเจ็บจากการจราจรทางถนนเป็นเวลาประมาณ 3 ปีที่เข้ารับการรักษาใน โรงพยาบาลท่าหลวง จังหวัดลพบุรี ซึ่งเป็นโรงพยาบาลระดับปฐมภูมิ (F2) ตั้งแต่เดือนมกราคม 2559 ถึง ธันวาคม 2561 โดยรวบรวมผู้ป่วยที่ได้รับบาดเจ็บจากอุบัติเหตุทางถนน การบาดเจ็บจากการจราจรในเขตอำเภอท่าหลวง รวบรวมข้อมูลโดยใช้บันทึกในฐานข้อมูลอิเล็กทรอนิกส์ของการบาดเจ็บจากอุบัติเหตุการจราจรบนท้องถนนของจังหวัดลพบุรี ข้อมูลจะถูกวิเคราะห์โดยสถิติแบบพหุปัจจัย **ผลการวิจัย** มีผู้ป่วยทั้งหมด 1,117 รายรวมอยู่ในการศึกษานี้ ความชุกของการบาดเจ็บที่ศีรษะจากอุบัติเหตุทางถนนในโรงพยาบาลท่าหลวงโดยรวมอยู่ที่ร้อยละ 11.1 ปัจจัยการไม่ปฏิบัติตามมาตรการด้านความปลอดภัย (odds ratio 5.39, 95%CI: 1.02-28.63) และไม่ปฏิบัติตามกฎหมาย (odds ratio 7.56, 95%CI: 1.42-40.26) สัมพันธ์กับการบาดเจ็บที่ศีรษะจากการจราจรทางถนนอย่างมีนัยสำคัญทางสถิติ **สรุป** ความชุกของการบาดเจ็บที่ศีรษะจากอุบัติเหตุทางถนนในโรงพยาบาลท่าหลวงยังคงสูงอย่างต่อเนื่องในช่วง 3 ปี มีความสัมพันธ์กับการไม่ปฏิบัติตามมาตรการด้านความปลอดภัย และการไม่ปฏิบัติตามกฎหมาย ดังนั้นแม้จะรณรงค์ต่อเนื่องมากกว่า 3 ปีแล้ว แต่เราแนะนำว่าการรณรงค์ควรเน้นเรื่องการสวมหมวกนิรภัย คาดเข็มขัดนิรภัย และส่งเสริมให้ประชาชนปฏิบัติตามกฎหมายให้มากขึ้น งานวิจัยนี้สามารถนำไปปรับใช้เพื่อให้ประเทศไทยกำหนดมาตรการใหม่เพื่อลดอุบัติเหตุได้ในอนาคต

คำสำคัญ: ● อุบัติเหตุการจราจร ● บาดเจ็บที่ศีรษะ ● ปัจจัยที่สัมพันธ์ ● โรงพยาบาลชุมชน ● ประเทศไทย

เวชสารแพทย์ทหารบก 2566;76(4):145-53.

ได้รับต้นฉบับ 25 ตุลาคม 2566 แก้ไขบทความ 4 พฤศจิกายน 2566 รับลงตีพิมพ์ 2 ธันวาคม 2566

ต้องการสำเนาต้นฉบับติดต่อ ร.อ. พงศ์พิสุทธิ์ ทาคำแปง ภาควิชาเวชศาสตร์ทหารและชุมชน วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า ถนนราชวิถี แขวงทุ่งพญาไท เขตราชเทวี กรุงเทพฯ 10400

Background

Road traffic accident is one of the most important problems around the world causing death and handicap. Therefore, WHO has raised many campaigns aiming to reduce road traffic accidents since 2000 A.D. However, the data from WHO reported that the number of road traffic accidents related to deaths continued to rise, reaching 1.35 million in 2016. However, the rate of death relative to the size of world's population has remained constant at 18.2 to 100,000 population. Studies in Europe showed that the most common organ in road traffic injury that is related to death and handicap is head. A report showed the number of head injury in road traffic accidents that is 235 per 100,000 and the death rate from head injury is 15 per year.

Thailand has the second highest road traffic fatality rate in the world at 36.2 per 100,000 with an annual estimate of over 24,000 deaths or 66 deaths every day. Referred to the Royal Thai Police, there is an analysis on an annual basis to identify leading causes of road traffic crashes in Thailand. In 2013, speed was identified as the main factor followed by dangerous lane changing, driving too close to the leading vehicle, drink driving, and inexperienced or new drivers. However, there is no evidence studying about factors related to the injury and factors relate to head injury in Thailand.

Thaluang district has second highest number of road traffic accidents in Lopburi Province in 2014. Road traffic accident is also the most common visit case in ER at Thaluang Hospital and the hospital did not ignore it. The traffic safety campaign was started in Thaluang district, including 6 sub-districts in cooperation with hospitals and community services, aiming to reduce the rate of injury. The campaign is about safety helmet using, safety belt using, awareness raising in schools, and reconstruction of the roads that are at risk to cause accidents. The cooperation was started four years ago;

however, the number of injure and death from road traffic injury is still high. This research aims to evaluate the effectiveness of the campaign and to identify risk factors related to head injury from road traffic accident.

According to previous studies, risk factors related to head injury from road traffic accident are bicyclists, motorcyclists, and pedestrians (Marek and other 2013), in which drivers tend to have higher risks than passengers (Roshdy and other 2005), especially in male (Amos and other 2017). The age group that is most related to head injury is under 25 years (marek and other 2013). However, there are few studies about associated factor related to head injury from road traffic injury. We aim to study associated factors related to head injury from road traffic injury to evaluate the effectiveness of Thaluang Hospital's Campaign.

Materials and methods

Study design

We conducted a retrospective cross-sectional 3-year study of road traffic injury patients attending a first-level referral (F2) hospital, Thaluang Hospital, in Lopburi province, Thailand from January 2016 to December 2018, and it was studied for the prevalence of head injury from road traffic injury and factor related to head injury.

Study population

Participants included (1) patients who suffered from road traffic injury in Thaluang District area including 6 Subdistrict: Thaluang, Hualum, Kangpukkood, Nhongpakwan, Subjumpar, and Thalaywangwad and (2) patients who visited Thaluang hospital.

Data collection

Data were collected using road traffic injury online records of Lopburi province, consisting of Date of injury, Place, Gender, Age, Rider or Passenger, Road type, Follow legislation, License, Severity of injury, treatment result, and Referral.

Definition

Road traffic accident is defined as an accident of vehicle(s) in the road that can potentially cause injury and death.

Follow the law in this research mean a road traffic campaign in Thailand which is a project setting to prevent road traffic injury in Thailand. It consists of (1) Driving without being drunk, (2) Driving with a helmet, (3) Safe motorcycle driving, (4) Driving with a driving's license, (5) Driving with a safety belt, (6) No fast driving.

The severity of injury was classified as (1) Resuscitation patients who require immediate life-saving intervention, (2) Emergency patients who are in a high risk situation, disorientated, with severe pain, or vitals are in the danger zone, (3) Urgency patients who multiple resources are required to stabilize, but vitals are not in the danger zone, (4) Semi-urgency patients who one resource is required to stabilize, (5) Non-urgent patients who do not require any resource to be stabilized.

Head injury in this research means traumatic brain injury ranged from mild traumatic brain injury, moderate risk, to severe traumatic brain injury.

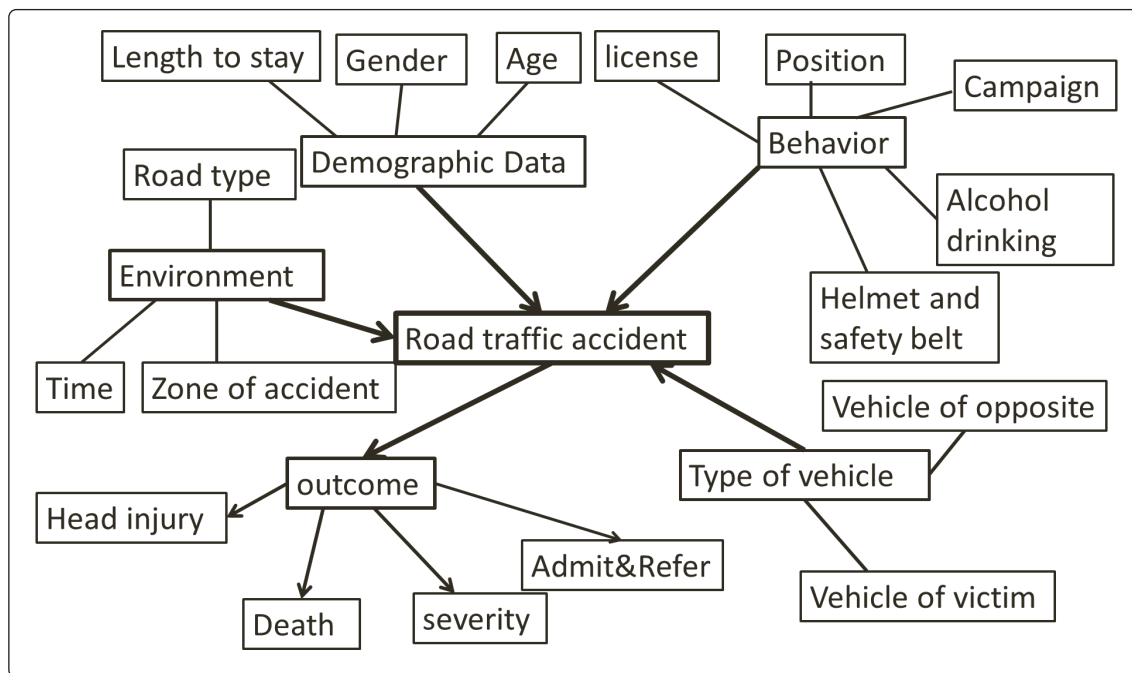
Drunk in this research means all people who drink beverages that have components of alcohol.

Statistical analysis

Statistical analysis was performed using SPSS version 22.0. We conducted analyses of the characteristic of the study population using descriptive analysis including percentage, mean, and standard deviation. The analytic statistical analysis for associated factors of road traffic injury was conducted by using chi-square test. Univariable and multivariable logistic regression model was performed. Crude and adjusted odds ratios (OR) were used to quantify the magnitude of associations.

Results

Data in this research were collected from patients who suffered from road traffic injury and visited Thaluang Hospital, which is classified as an F1 level hospital. The number of samples enrolled in this study is 1,117. The average age is 31.28 ± 17.56 years old, of which the minimum age is 1 and the maximum age is 85 years old. Male is more common than female at 69.2%. Other demographic information includes as driving position,



Conceptual framework

Table 1 Demographic data

Characteristic	No. (n = 1117)	Percent (%)	No. of head injury	(%)
Gender				
Male	773	69.2	94	12.2
Female	344	30.8	30	8.7
Age				
<20	429	38.5	41	9.6
21-40	335	30.1	33	9.9
41-60	275	24.7	42	15.3
>61	75	6.7	7	9.3
Driver				
Yes	855	80.8	102	11.9
No	203	19.2	19	9.4
Type				
Motorcycle	899	82.3	92	10.2
Bicycle	15	1.4	5	33.3
Three-wheelers	21	1.9	1	4.8
Car	157	14.4	23	14.7
Helmet /safety belt use				
Yes	170	15.3	109	11.6
No	941	84.7	12	7.1
Drunk				
No	819	74	46	16.0
Yes	28	26	73	8.9
License				
Yes	83	29	22	10.8
No	203	71	13	15.7
Follow the law				
Yes	34	7.9	44	11.2
No	394	92.1	5	14.7
Length of stay				
> 3 mo	887	79.4	23	10.0
< 3 mo	773	69.2	101	11.4
Time of accident				
0-5	85	7.6	8	9.4
6-11	240	21.5	25	10.4
12-17	381	34.1	44	11.6
18-23	410	36.7	47	11.5

Table 1 Demographic data (continues)

Characteristic	No. (n = 1117)	Percent (%)	No. of head injury	(%)
Place of accident				
Thaluang	436	40.1	43	9.9
Kangpakkood	133	12.2	14	10.5
Nhongpakwan	186	17.1	24	12.9
Subjumpar	124	11.4	11	8.9
Hualum	163	15	21	12.9
Thalaywangwad	46	4.2	8	17.4
Head Injury				
Yes	124	11.1		
No	992	88.9		
Severity of injury				
Resuscitation	14	1.8	7	50.0
Emergency	37	4.7	14	37.8
Urgency	202	25.5	40	19.8
Semi-urgency	442	55.9	29	6.6
Non-urgency	84	10.6	1	1.2
Road type				
Local road	914	83.7	90 (11.4%)	11.4
High way	21	1.9	29 (12.2%)	12.2
In town	157	14.4	5 (11.4%)	11.4
Death				
Yes	39	4.2	9	23.1
No	890	95.8	69	7.8
Refer				
Yes	133	11.9	35	26.3
No	984	88.1	89	9.1

type of vehicle, using safety protocol, drinking driving, having license, follow the law, length of stay, time of accident, place of accident, head injury, severity of injury, road type, death, and refer.

Table 2 shows the trend of the number of road traffic injury from 2016 to 2018 including changes of the numbers in gender, safety protocol, drinking driving, head injury, refer, and death.

Table 3 shows the prevalence of head injury and risk factors associated with head injury. The data including

gender, age, driver, drinking, and type of vehicles are analyzed by chi-square, and found age 40-60 (p -value = 0.02), bicycle ($p \leq 0.01$), and drinking (p -value ≤ 0.01) were statistically associated.

After that, multivariate logistic regression analysis was conducted and adjusted for gender, driver, time of accident, safety protocol, drinking, license, and follow the law. We found that not following safety protocols was five times more likely to suffer from head injury in road traffic accidents, statistically significant (CI =

Table 2 Shows the trend of road traffic injury in each year

Characteristic	2016	2017	2018
Number of Road Traffic Injury	336	441	340
Age (< 20 years old)	127 (37.8%)	172 (39%)	130 (38.2%)
Male number	233 (69.3%)	323 (73.2%)	217 (63.8%)
Not Following Safety Protocol	279 (83%)	368 (83.8%)	294 (86.5%)
Drinking Driving	96 (28.7%)	105 (24%)	87 (25.6%)
Head Injury	35 (10.4%)	55 (12.5%)	34 (10%)
Referral	42 (12.5%)	43 (9.8%)	42 (12.5%)
Death	15 (5.6%)	8 (1.8%)	15 (4.7%)

Table 3 Univariable and multivariable analysis for factors associated with head injury in road traffic injury.

	Head injury case (%)	Crude OR	95%CI	p-value	Adjusted OR	95%CI	p-value
Gender							
Female	30 (8.7%)	1			1		
Male	94 (12.2%)	0.69	0.45-1.06	0.09	0.66	0.21-2.14	0.49
Age							
<20	41 (9.6%)	1					
21-40	33 (9.9%)	0.96	0.60-1.56	0.88			
41-60	42 (15.3%)	0.59	0.37-0.93	0.02			
>61	7 (9.3%)	1.03	0.44-2.38	0.95			
Driver							
No	19 (9.4%)	1			1		
Yes	102 (11.9%)	1.94	1.31-2.89	< 0.01	0.33	0.06-1.79	0.2
Type							
Motorcycle	92 (10.2%)	1					
Bicycle	5 (33.3%)	0.23	0.08-0.68	< 0.01			
Three-wheelers	1 (4.8%)	2.28	0.3-17.19	0.43			
Car	23 (14.7%)	0.66	0.4-1.08	0.1			
Place of Accident							
Thaluang	43 (9.9%)	1		0.52			
Kangpakhood	14 (10.5%)	0.93	0.49-1.76	0.83			
Nhongpakwan	24 (12.9%)	0.74	0.44-1.26	0.27			
Subjumpar	11 (8.9%)	1.13	0.56-2.26	0.74			
Hualum	21 (12.9%)	0.74	0.43-1.29	0.29			
Thalaywangwad	8 (17.4%)	0.52	0.23-1.19	0.12			

Table 3 Univariable and multivariable analysis for factors associated with head injury in road traffic injury (continues)

	Head injury case (%)	Crude OR	95%CI	p-value	Adjusted OR	95%CI	p-value
Time of Accident							
6-11	25 (10.4)	1			1		0.49
12-17	44 (11.6%)	0.89	0.53-1.49	0.65	1.390	0.39-4.92	0.61
18-23	47(11.5%)	0.9	0.54-1.5	0.68	1.240	0.36-4.3	0.73
0-5	8 (9.4%)	1.12	0.48-2.59	0.79	6.170	0.58-66.06	0.13
Length of Stay							
> 3 months	23 (10.0%)	1					
< 3 months	101 (11.4%)	1.16	0.72-1.87	0.55			
Safety protocol							
Yes	109 (11.6%)	1			1		
No	12 (7.1%)	0.08	0.93-3.21	1.73	5.39	1.02-28.63	0.05
Drunk							
No	46 (16.0%)	1			1		
Yes	73 (8.9%)	1.94	1.31-2.88	< 0.01	0.52	0.20-1.37	0.19
License							
Yes	22 (10.8%)	1			1		
No	13 (15.7%)	1.53	0.73-3.20	0.26	2.060	0.79-5.37	0.14
Follow the Law							
Yes	44 (11.2%)	1			1		
No	5 (14.7%)	1.37	0.51-3.73	0.54	7.560	1.42-40.26	0.02

1.02-28.63, p -value = 0.05). Not following the law was seven times more likely to have head injury in road traffic injury, statistically significant (95%CI: 1.42-40.26, p -value = 0.02).

Discussion

According to the analysis, the study found that the overall prevalence of head injury case in road traffic injury at Thaluang Hospital is 11.1%. We also found that the prevalence of head injury in 2016, 2017, and 2018 are 10.4%, 12.5%, and 10.0%, respectively. Therefore, the prevalence of road traffic injury and the head injury did not show improvement of the community intervention. However, there is a decline in the death rate.

The study was also aim to identify the risk factor associated with head injury. We found that not following safety protocols and not following the law are statistically significant associated with head injury.

The result from this research could mean that the campaign and law enforcement in Thailand is not successful. The new intervention must be introduced in new generations and their family to keep the motivation, and the community needs participation, strategic plans, and result assessment. Law enforcement must be implemented continuously and more legal punishment is needed. This plan can reduce accidents in Thailand in the future.

Conclusion

The overall prevalence of head injury from road traffic injury at Thaluang Hospital is 11.1%. It is significantly associated with not following safety protocols and not following the law. Therefore, despite continuing campaign for more than three years, we suggest that the campaign should still be emphasized more about wearing a helmet, wearint a safety belt, and encouragint people to follow the law.

Reference

1. Farghaly A, El-Khayat R, Awad W, George S. *Head Injuries in Road Traffic Accidents [Internet]. Assiut, Egypt: Faculty of Medicine, Assiut University;2007 [Cited 2023 Dec 11]. Available from: [http:// t.ly/fyEgJ](http://t.ly/fyEgJ)*
2. Majdan M, Mauritz W, Wilbacher I, Janciak I, Brazinova A, Rusnak M, et al. *Traumatic brain injuries caused by traffic accidents in five European countries: outcome and public health consequences. Eur J Public Health. 2013;23(4):682-7.*
3. World Health Organization. *Global status report on road safety 2018. Geneva: WHO;2018. p.7-12*
4. World Health Organization. *Global status report on road safety 2018. Geneva: WHO;2018. p.14-16*
5. World Health Organization. *Road traffic injuries and motor vehicle type. Road safety institutional and legal assessment Thailand. Geneva: WHO;2015. p. 8-11.*
6. Javouhey E, Guérin AC, Chiron M. *Incidence and risk factors of severe traumatic brain injury resulting from road accidents: a population-based study. Accid Anal Prev. 2006;38(2):225-33.*

