Drug and Alcohol Review (1999) 18, 293–298

High prevalence of drink-driving in Thailand

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Abstract

This study was conducted to measure the prevalence of drivers with a blood alcohol concentration (BAC) over 50 mg/dl and to identify predictors for such an outcome. A cross-sectional study was conducted during March to August 1995 in eight provinces in Thailand. In each province, with the collaboration of the police, one checkpoint in a suburban area and one on a highway were used to collect data on drivers of 20 motorcycles, 20 4-wheel and 20 6 + -wheel motor vehicles, during 1300–1500 h, 1700–1900 h and 2200–2400 h. For each subject, a breath test for alcohol was undertaken using standard breath testing instruments. Four thousand, six hundred and seventy-five male drivers were tested. The crude prevalence of high BAC was 12.6% (range 4.5–23.7%). The differences in prevalence between the suburban area (8.7%) and the highway (8.4%) and between drivers tested on weekdays (9.8%) and on holidays (7.5%) were not statistically significant. The crude prevalences were 3.4–3.8% and 3.8–3.9% at 1300–1500 h and 1700–1900 h, respectively. During 2200–2400 h the prevalence rose to 19.2%, 16.0% and 11.9% among the motorcyclists, the 4-wheel vehicle drivers and the 6 + -wheel vehicle drivers, respectively. High BAC among Thai

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Received 19 June 1998; revised version 1 December 1998; accepted for publication 8 February 1999.

ISSN 0959–5235 print ISSN 1465–3370 online/99/030293–06

drivers in the study period was very common, especially at night. Efforts should be focused on these high-risk groups and this time period. [Chongsuvivatwong V, Ritsmitchai S, Surayawongpaisal P, Charyalertsak W, Kosuwan W, Punyaratabandhu P, Sutiwipakorn W, for the Traffic Behaviour Study Group of Thailand. *Drug Alcohol Rev* 1999;18:293–298]

Key words: blood alcohol; Thailand; traffic behaviours; night drivers; logistic regression.

Introduction

High blood alcohol concentration (BAC) is well known to be a major cause of road accidents [1,2]. BACs of 0.05 mg/dl or higher result in impairment of nearly all the important components of drivers' performance [3].

In Thailand, where the rate of traffic injury was as high as 302 per 100 000 population per year in 1992 [4], the regulation of BAC has not been settled and the law has not been fully enforced. The situation in the country represents what is happening in many countries where the economic growth rate is high, alcohol consumption and car ownership are increasing, but road and policy on drink driving are underdeveloped. Therefore, it is appropriate to conduct a study to obtain the baseline prevalence and to identify high-risk groups, places and times so that resource efficiency in the near future can be maximized.

This study was one of a series of multi-centre studies involving five universities in Thailand covering five domains of risk: blood alcohol, knowledge of road signs, road use (drivers and pedestrians) and road environments. The current report concerns only the first part.

The objective of this study was to obtain the prevalence of high BAC among different groups of drivers at different times of the day in a suburban area and on the highway in eight selected provinces.

Methods

The study was carried out during March to August 1995 as a cross-sectional survey. Study provinces were selected, based on a previous study of traffic behaviours carried out in 1992, to allow comparision of the results (although this is the first extensive alcohol study of the country). The selected provinces were: Bangkok and Ayutthya in the central region, Chiangmai and Tak in the northern region, Khon Kaen and Nakhon Ratchasima in the northeastern region and Songkla and Phuket in the southern region. In each region, the study team consisted of staff from the provincial university and the teaching college in the region.

The questionnaire taking information on sex and age of the driver and the observation checklists on driving licence and type of vehicle were prepared in the co-ordinating centre specifically for the purpose of this study. It was then pilot-tested in each region, and modified where necessary. After several meetings, a final common questionnaire and the checklists were used.

The study was designed originally to use the same model of breath test instruments (Lion Alcometer SL-400), obtained from the Department of Land Transportation. However, as the number of instruments was inadequate, the PBA 3000 model was used in the northern region. For all sites, the instruments were calibrated and the cut-off point for reporting high BAC was 50 mg/dl or above. A parallel study conducted by another research team in Thailand comparing readings from both instruments with the results from gas chromatography demonstrated high level of agreement (unpublished).

There were two checkpoints on two main roads in each province, one on a highway and the other in a suburb. Checkpoints were chosen on the basis of convenience for car stopping and breath testing. The research team spent 2 days at each checkpoint, one being a weekday and the other a holiday. In the case of rain, data collection was postponed to the next eligible day. During the data collection period, the police randomly requested 3–4 vehicles to stop at a time. The driver was approached and it was explained that this was part of a research project. Interview and breath testing was then conducted on voluntary basis. Data collection in the period finished when the number of drivers in each category (motorcycle, 4-wheel car or pick-up and 6 + -wheel truck or bus) reached 20 or the time was up. Data were computerized and statistical analysis was carried out at the co-ordinating centre.

Table 1. *Number of vehicles studied by time and province*

Province	1300–1500 h	1700–1900 h	2200–2400 h	Total
Bangkok	238	219	200	657
Ayutthya	233	228	231	692
Nakhon-Ratchasima	224	229	234	687
Khon Kaen	239	239	235	713
ChiangMai	0	0	387	387
Tak	0	0	295	295
Phuket	236	242	242	720
Songkhla	171	186	167	524
Total	1341	1343	1991	4675

For the statistical analysis, descriptive statistics and tabulation were used initially to obtain the breakdown of the crude prevalence. Logistic regression [5] was applied forcing type of checkpoint (highway vs. suburb), time (afternoon, evening and 2 hours before midnight) and day (weekday vs. holiday) of data collection and type of vehicle (motorcycle, 4-wheel and 6 + -wheel) in the model in order to show independent effects of all variables. Prevalence odds ratio and 95% confidence interval were used to compare the subgroups with adjustment for other variables. The reference level of each variable was given an odds ratio of 1. The odds ratios in other specific categories then indicate how many times the odds for subjects in that category are to have a high BAC compared to the reference category.

Results

Of the 4778 cars stopped the refusal rate for breath testing was less than 1%. One hundred and three (2%) had female drivers. This subgroup was excluded in subsequent multivariate analysis because the size was too small and was considered to be different from the remaining drivers. Table 1 shows the distribution of the sample by province and time. In the northern region, due to lack of police personnel, data collection was carried out only between 2200 h and 2400 h. The overall prevalence of BAC above 50 mg/dl was 8.68%.

The prevalence of drink driving in suburban areas and on highways were 8.7 and 8.4%, and those during weekdays and holidays were 9.8 and 7.5%, respec-

Table 2. *Summary of prevalence (%) of drivers having blood alcohol concentration exceeding 50 mg/dl from eight provinces*

	Motorcycle	4-wheel	6 + -wheel
1300–1500 h*			
Average	2.4	2.7	2.8
(min–max)	(0–3.7)	(0–3.8)	(0–3.7)
1700–1900 h*			
Average	3.8	3.8	3.9
(min–max)	(2.5–5.3)	(0–7.8)	(0–3.6)
2200–2400 h			
Average	19.2	16.0	11.9
(min–max)	(6.3–31.4)	(6.2–30.5)	(2.7–31.0)

*No data collected from the two northern provinces.

Table 3. *Association between high blood alcohol concentration and various risk factors*

	BAC		
	< 50 mg dl	= > 50 mg dl	adj. OR (95% CI)
Site			
Highway	2253	216	1
Suburb	2015	190	0.997 (0.80–1.24)
Day			
Weekday	2079	227	1
Holiday	2190	179	0.82 (0.66–1.02)
Province			
Bangkok	607	50	1
Ayutthya	661	31	0.52 (0.32–0.83)
Nakhon Ratchasima	613	74	1.40 (0.95–2.06)
Khon Kaen	686	27	0.44 (0.27–0.72)
Chiangmai	263	124	2.31 (1.57–3.38)
Tak	280	15	0.26 (0.14–0.48)
Phuket	672	48	0.80 (0.53–1.23)
Songkhla	487	37	0.86 (0.54–1.35)
Vehicle			
Motorcycle	1461	166	1
4-wheel	1443	141	0.82 (0.64–1.05)
6 + -wheel	1365	99	0.67 (0.51–0.88)
Time			
1300–1500 h	1305	36	1
1700–1900 h	1291	52	1.45 (0.94–2.23)
2200–2400 h	1673	318	5.80 (4.01–8.39)

tively. It is obvious that the rate sharply increased at night (Table 2). Motorcycle drivers had similar rates compared to other drivers during the daytime. In the 2 hours up to midnight, the rate increased to approximately every one in five of tested motorcyclists, which was the highest among all drivers.

Table 3 shows results from logistic regression, which computed the effects of each independent variable adjusted for all others. There was no significant difference between suburban and highway drivers, drivers on weekdays and on holidays. There was a significant difference among different provinces, with Chiangmai having the highest prevalence and Tak the lowest. The size of vehicle was negatively associated with the odds of drink driving. Four-wheel vehicle drivers had 0.82 and 6 + -wheel drivers had 0.67 the odds of drink driving, as did motorcyclists. During early evening the adjusted odds of having a high BAC driver increased from daytime by 45%. In the period up to midnight, the adjusted odds for all groups increased from daytime 5.8 times.

Discussion

We have found in this study that Thailand has a high prevalence of drink driving compared with studies conducted in other countries (see Table 4). Several factors have to be considered in relation to the results.

During the study period, legal action to control drink driving had been minimal. Breath testing was not a control measure and had never been carried out in Thailand before. As the test was not supported by law during the study period, it was difficult to obtain a representative sample for all drivers. There were fewer female drivers at night when most of the data

Table 4. *Prevalence of driver having blood alcohol concentration higher than 50 mg/dl by country*

Country	Year	Drivers tested	% BAC > 50 mg/dl
Denmark	1985–1987	60 500	1.14
Germany			
West	1992–1994	9 041	1.2
East		11 069	0.85
Spain	1991	1 044	8.90
France	1991–1992		4.5
Finland	1991	140 000	0.2
Netherlands	1994	16 326	4.9
Norway	1981–1982	71 999	0.27
Sweden	1975		0.1
Thailand (this study)		4673	8.68

*Source: see [8].

collection took place. This group of drivers might have a greater chance of being exempted and thus a high chance of bypassing the checkpoint. This bias might also happen with other privileged groups of drivers. Therefore, it is likely that our sample might be over-represented by lower middle-class males, who were likely to have higher levels of alcohol consumption. On the other hand, we had ensured that the checkpoints were not selected near any public house or restaurant, to avoid another potential cause of bias. Therefore, bias resulting from site selection was unlikely. The problem of drivers with high BAC missing the checkpoint was documented by Well *et al* [6]. When the test is enforced in Thailand in future, it will be necessary to establish a system to minimize such avoidance. In addition to these potential biases, accurate estimation of the traffic flow was not possible due to lack of electronic counting devices used in traffic engineering. The weighting factor for each province was therefore not available.

While different instruments were used in the northern province, we used only the common cut-off points for BAC of 50 mg/dl. The two types of instruments were shown to have high measurement agreement using gas chromatography. It is unlikely that comparability of the results from different instruments will present a major problem; both the highest and the lowest adjusted prevalences were found to be in the northern region.

The high prevalence of high BAC, especially at night, is vitally important information. Combined with poor visibility and relatively poor rescue facilities at night, travel during this period of the day in Thailand could be dangerous. This increased risk could be enhanced considering that modern life-styles increase night work and night transportation.

Motorcyclists were at highest risk of having a high BAC, especially around midnight. The motorcycle is the most commonly used vehicle in this country and contributes the highest mortality [7]. Thus, a random breath test programme must focus on this group in order to reduce the number of road accidents.

In general, the prevalence in this study of high BAC in Thailand was considerably greater than has been found in most European studies except in Spain (see Table 4). As BAC substantially and progressively increases the risk for road accidents [1,2], the high prevalence of this problem in Thailand is a major threat to the community. Breath testing for alcohol has been shown to be an effective measure against such risky behaviour [9,10]. It is recommended that such a measure should be planned as soon as possible. Emphasis on breath testing should be made at night, a period when the prevalence of elevated BAC is high.

In parallel to the current study, other research projects were carried out in the same provinces which showed that the prevalence of exceeding the speed limit was 37–54% and the average incidence of driving through a red traffic light was 0.6–3.7 vehicles per observed light cycle. High levels of such illegal high-risk driving suggest that legislation of measures to

control drink driving is unlikely to be enough to reduce the road accident rate. Further behavioural research and law enforcement are extremely important. Finally, more epidemiological research projects are necessary to monitor the effectiveness of the control programme for traffic accidents in this country.

Acknowledgements

This study was supported by the Thai Health Research Institutes. The research team would like to thank the Department of Police and the Department of Land Transportation for their co-operation. Preparation of this manuscript was partially supported by the Thailand Research Fund.

References

[1] Zador PL, Lund AK, Fields M, Weinberg K. Fatal crash involvement and law against alcohol-impaired driving. J Public Health Policy 1989;10:467–85.

[2] Robertson LS. Blood alcohol in fatally injured drivers and the minimum legal drinking age. J Health Politics Policy Law 1989;14:817–25.

[3] Moscowitz H, Robinson CD. Effect of low doses of alcohol on driving related skills: a review of evidence. Technical Report DOT-HS-807–280. Washington DC: National Highway Traffic Administration, 1988.

[4] Santikran C, Kumnarkkawe K. Situation of motor vehicle accidents in Thailand 1987–1992. Bangkok: Ministry of Public Health, 1994 [in Thai].

[5] Breslow NE, Day NE. Statistical methods in cancer research. Vol. 1. The analysis of case–control studies. IARC Scientific Publication no. 32. Lyon: International Agency for Research on Cancer, 1980: 192–249.

[6] Well JK, Greene MA, Foss RD, *et al.* Drivers with high BACs missed at Sobriety Checkpoints. Alington, VA, USA: Insurance Institute for Highway Safety, March 1996:1–12.

[7] Statistics on motor vehicle registry in accordance with Motor Vehicle Act 1980–1989 and a projection for 1994. Thailand: Department of Land Transport, 1995:111–113.

[8] Biecheler Fretel MB, Cauzard JP. The incidence of drink-driving in Europe. Proceedings of the 14th World Congress of the IAATM, 20–23 August 1995, Singapore, pp. 97–104.

[9] Levy D, Shea D, Asch P. Traffic safety effects of sobriety checkpoint operation and other local DWI programs in New Jersey. Am J Public Health 1988;79: 291–3.

[10] Wells JK, Preusser DF, Williams AF. Enforcing alcohol-impaired driving and seat belt use laws, Binghamton, N.Y. J Safety Res 1993;23:63–71.