

Prevalence and associated factors of low back pain among motorcycle taxi drivers in Sriracha

Nahatai Jongprasitkul*

Komwudh Konchalard** Kunakorn Sinthoppong*

Jongprasitkul N, Konchalard K, Sinthoppong K. Prevalence and associated factors of low back pain among motorcycle taxi drivers in Sriracha. Chula Med J 2016 Jan – Feb;60(1): 31 - 43

- Background** : *Low back pain (LBP) is a common disorder associated with muscle and the skeleton structure. It is also generally found in all age groups and professions. LBP also affects the financial loss in society and activity of daily living. Motorcycle taxi drivers (MTD) are mainly focused in the study because it is one of the most common careers which tends to grow rapidly in the future. There is no study in this topic before.*
- Objective** : *To determine the prevalence and associated factors of low back pain among the motorcycle taxi drivers in Sriracha District, Chonburi, Thailand.*
- Setting** : *Sriracha District, Chonburi, Thailand.*
- Design** : *A Cross-sectional descriptive study*
- Material and Methods** : *Questionnaires were constructed and distributed to 120 MTDs in Sriracha. The questionnaires covered the general demographic conditions, and the Thai version of Oswestry. The data were collected and interpreted via t – test, F – Test, least significant difference (LSD) and Chi-square test.*

* Department of Family Medicine, Queen Savang Vadhana Memorial Hospital, the Thai Red Cross Society, Chonburi Province 20110, Thailand.

**Department of Rehabilitation Medicine, Queen Savang Vadhana Memorial Hospital, the Thai Red Cross Society, Chonburi Province 20110, Thailand.

- Results** : *The prevalence of low back pain was 58.3 %. The risk factors were described: individual risk (genders, ages, and weights), work-related factors (working hours and work type) and health-related factors (ongoing medical issues, smoking habit, alcohol consumption, injury/surgery on the back, sleeping pattern). The statistical significance was less than 0.05.*
- Conclusions** : *Motorcycle taxi drivers in Sriracha had the prevalence of low back pain around 58.3 %, in which the individual risk factors, work-related factors and health-related factors were involved. In addition, there were no difference in disability scores between full-time and part-time job.*
- Keywords** : *Back pain, prevalence, motorcycle taxi driver, Sriracha, Chonburi Province.*

Reprint request: Konchalard K. Department of Family Medicine, Queen Savang Vadhana Memorial Hospital, the Thai Red Cross Society, Chonburi Province 20110, Thailand.

Received for publication. April 28, 2015.

ณัทชัย จงประสิทธิ์กุล, คมวุฒิ คนฉลาด, คุณากร สิ้นธพวงศ์. การศึกษาความชุก และปัจจัยที่เกี่ยวข้องของอาการปวดหลังส่วนล่างของผู้ประกอบอาชีพขับรถจักรยานยนต์รับจ้างในเขตเทศบาลเมืองศรีราชา. จุฬาลงกรณ์เวชสาร 2559 ม.ค. - ก.พ.;60(1): 31 - 43

- บทนำ** : อาการปวดหลังเป็นโรคของระบบกล้ามเนื้อและกระดูกโครงร่างที่พบได้บ่อยที่สุดในทุกเพศทุกวัย ซึ่งส่งผลกระทบต่อเศรษฐกิจและสังคม การใช้ชีวิตประจำวัน และพบในหลายอาชีพสำหรับอาชีพขับรถจักรยานยนต์รับจ้างได้รับความนิยมสูงและมีจำนวนมาก ในขณะนี้การวิจัยนี้จึงสร้างขึ้น เนื่องจากเป็นกลุ่มประชากรที่กำลังเจริญเติบโตและยังไม่เคยมีการศึกษามาก่อน
- วัตถุประสงค์** : เพื่อศึกษาความชุกและปัจจัยที่เกี่ยวข้องของอาการปวดหลังส่วนล่างในผู้ประกอบอาชีพขับรถจักรยานยนต์รับจ้างในเขตเทศบาลเมืองศรีราชา
- สถานที่ทำการศึกษา** : เขตเทศบาลเมืองศรีราชา
- รูปแบบการทำวิจัย** : การศึกษาเชิงพรรณนา
- วิธีการศึกษา** : แจกแบบสอบถามให้ผู้ประกอบอาชีพขับรถจักรยานยนต์รับจ้างในเขตเทศบาลเมืองศรีราชา จำนวน 120 ตัวอย่าง โดยใช้แบบสอบถามเกี่ยวกับข้อมูลทั่วไปและแบบสอบถามออกสเวสต์รีดบับภาษาไทย และนำมาวิเคราะห์ข้อมูลโดยใช้ t - test , F - Test, LSD และ Chi-square test
- ผลการศึกษา** : พบความชุกของอาการปวดหลังส่วนล่างร้อยละ 58.3 โดยปัจจัยที่เกี่ยวข้องด้านส่วนบุคคล ได้แก่ เพศ อายุ และน้ำหนัก ด้านการทำงาน ได้แก่ ระยะเวลาประกอบอาชีพ ระยะเวลาทำงานต่อวัน และลักษณะการทำงาน ด้านสุขภาพ ได้แก่ การมีโรคประจำตัว การสูบบุหรี่ การดื่มสุรา การได้รับอุบัติเหตุบริเวณหลัง การได้รับการผ่าตัดบริเวณหลัง และการนอนหลับอย่างมีนัยสำคัญทางสถิติ ($p < 0.05$)
- สรุป** : ผู้ประกอบอาชีพขับรถจักรยานยนต์รับจ้างในเขตเทศบาลเมืองศรีราชา มีความชุกของอาการปวดหลังส่วนล่าง ร้อยละ 58.3 มีปัจจัยที่เกี่ยวข้องกับอาการปวดหลังส่วนล่างทั้งทางด้านส่วนบุคคล ทางด้านการทำงาน และทางด้านสุขภาพ ไม่พบความแตกต่างกันของระดับความรุนแรงและการจำกัดกิจวัตรประจำวันระหว่างผู้ที่ประกอบเป็นอาชีพหลักกับผู้ที่ประกอบเป็นอาชีพเสริม
- คำสำคัญ** : ปวดหลัง, ความชุก, จักรยานยนต์รับจ้าง, ศรีราชา จังหวัดชลบุรี.

Low back pain (LBP) is a pain, stress and fatigue of the muscles found below the costal margin and above the inferior gluteal fold. In some cases, the pain might move from the lower back down into the legs and feet.⁽¹⁾ LBP is one of the musculoskeletal symptoms found in all age groups. The studies from United States revealed that LBP is the most common type of pain in the adult, secondly compared to the flu.⁽²⁾ In Thailand, LBP tends to increase in the labor, in which 43% of them had previous experience of back or joint pain.⁽³⁾ LBP is a chronic problem and repetitive symptom, which results in large economic loss such as for health care expends, missed work days, need for care givers, etc. The example of financial loss in United State in 1998, it is shown that the cost of health care in LBP was 90,000 million USD.⁽⁴⁾ Accordingly, in Thailand, the therapeutic cost of musculoskeletal pain is more than 93,000 million baht annually,⁽⁵⁾ compared to coronary artery diseases, which is 1,071 million baht per year.⁽⁶⁾

Motorcycle taxi drivers (MTDs) in Thailand began the services in 1981 (2524 B.E.).⁽⁷⁾ Nowadays, this profession is popular and increases in number every year especially in the urban areas, which have the traffic problems.⁽⁸⁾ Motorcycle driver are exposed to increased risk of musculoskeletal pain.^(9,10) The study focused on investigation of the prevalence, associated factors and effects, which can develop LBP among MTDs in Sriracha. The District of Sriracha has high economic growth and employment rate which is increasing dramatically, which causes overpopulation and traffic jam. In this scenario, MTDs has become one of the most interesting careers in this city. At present, few people are concerned about the study of the prevalence and associated factors

of LBP among this group of workers and this research can be used to improve the average health of people in this career in the near future.

Objective

1. To determine the prevalence of LBP among motorcycle taxi drivers in Sriracha
2. To study the associated factors of LBP among motorcycle taxi drivers in Sriracha consist of individual risk factors, working-related factors and health-related factors.
3. To study the effect of LBP among motorcycle taxi drivers in Sriracha consist of ability of work and daily living.

Research design

A cross-sectional descriptive study

Place of study

Sriracha district, Chonburi Province.

Samples

Motorcycle taxi drivers in Sriracha

Methods

The questionnaire of LBP symptom contains 2 sections:

Section 1 : 21 general questions on the background information such as personal details, work descriptions and symptoms of lower back pain.

Section 2 : To measure the severity level of LBP via 10 questions of Thai version Oswestry Disability Questionnaire.⁽¹¹⁻¹⁴⁾

The 120 subjects were recruited from motorcycle taxi drivers in Sriracha, in which the self-administration was carried out by researchers including collecting and evaluating in each question with quota sampling method. From the survey of local

MTDs (the researcher investigated and collected from an entire area), it was shown that the service points were spread around Sriracha. In addition, the perimeter of service was around 4 square kilometers of Sriracha, which has around 32 service points and 2 - 4 persons per each point.

Statistical analysis

The comparison of general data in LBP and non-LBP patients and associated factors. Descriptive statistic was used to describe the results of the study such as frequency distribution, percentage, mean and standard deviation: Quantitative analysis to test the statistical differentiation via student's t-test (t – test) and F-test. The means of each groups were compared with the least significant difference (LSD) and significant difference was determined via Chi-square test for qualitative analysis with significance less than 0.05. Data were analyzed and evaluated via static software.

Results

According to the 120 sets of questionnaires, it was shown that the prevalence of LBP among motorcycle taxi drivers in Sriracha was 58.3 % (70 from 120 subjects) in which 40 of 75 male participants suffered from LBP, while 18 of 48 female participants had. Majority of the respondents were male with the age around 31 - 40 years old, height between 160 - 170 centimeters, weight 50 - 60 kilograms and the highest degree of education was vocational certificate respectively. Majority of the respondents who suffered from LBP, did not take motorcycle taxi drivers as their main job, shown in Table 1 and they experienced this job around 3 - 5 years. Working duration was less

than 6 hours per day and mostly work 5 - 6 days a week. The drivers worked more than 4 hours/course in average and prefer Honda (less than 130cc.) and Yamaha (less than 115 cc.). Their health information showed that the respondents suffered from LBP, it was shown that they were having ongoing medical issues, smoking and drinking, lacking exercises, no injury/surgery on the back and sleep less than 8 hours a day. They felt mild pain and mostly after the work or exposed to long driving duration. When the symptom occurred, the subjects commonly decided to see the physicians in local area. The result of pain severity and limits of daily activity showed that the majority of subjects had moderate stage of limit activity, secondly to that were severe stage and lastly mild stage respectively. None of the subjects were crippled or in bed-bound stage.

The study of associated factors of LBP revealed that the mean of height and BMI of LBP and non-LBP had no significant value ($p > 0.05$) as shown in table 1. From table 2, the result of relationship between factors showed that there was no promising connection of LBP among MTDs, which was education degree, working hour, work frequency per week, brand of motorcycle, type of exercise and operation history ($p > 0.05$).

The relationship of risk factors and LBP among MTDs shows that individually associated factors which were gender, age and weight. Work related factors were namely length of years spent on riding, working hours and their working behaviors. Health related factors were ongoing medical issues, smoking habit, alcohol consumption, injury on the back and sleep habits ($p < 0.05$). (Table 2)

Table 1. The comparison of basic quantitative data between LBP and non-LBP participants during the survey.

Data	LBP of motorcycle taxi driver		P-value
	Yes	No	
Weight (Kg)	60.89 ± 12.60	61.52 ± 12.47	0.001*
Height (Cm)	165.34 ± 17.72	167.23 ± 17.54	0.071
BMI (Kg/m ²)	18.62 ± 2.33	18.73 ± 2.42	0.097

Table 2. The comparison of basic qualitative data between LBP and non-LBP participants during the survey.

Data	LBP of motorcycle taxi driver		P-value
	Yes	No	
Sex			0.034*
- Male	40 (55.56)	32 (44.44)	
- Female	30 (62.50)	18 (37.50)	
Age (Years)			0.000*
20 - 30	22 (55.00)	18 (45.00)	
31 - 40	34 (61.82)	21 (38.18)	
41 - 50	11 (52.38)	10 (47.62)	
>50	3 (75.00)	1 (25.00)	
Educational level			0.166
- Primary school or lower	13 (56.52)	10 (43.48)	
- Junior high school	16 (72.73)	6 (27.27)	
- Senior high school	8 (72.73)	3 (27.27)	
- Vocational degree	23 (54.76)	19 (45.24)	
- Bachelor degree or higher	10 (45.45)	12 (54.55)	
Full-time job			0.613
- Yes	29 (50.00)	29 (50.00)	
- No	41 (66.13)	21 (33.87)	
Working lifetime (Years)			0.026*
<3	10 (45.45)	12 (54.55)	
3 - 5	27 (58.70)	19 (41.30)	
>5 - 10	10 (45.45)	12 (54.55)	
>10 - 20	20 (76.92)	6 (23.08)	
>20	3(75.00)	1(25.00)	
Working/day (Hours)			0.001*
<6	39 (54.93)	32 (45.07)	
6 - 8	13 (41.94)	18 (58.06)	
9 - 15	14 (100.00)	0(0)	
>15	4(100.00)	0(0)	

Table 2. (Continuous) The comparison of basic qualitative data between LBP and non-LBP participants during the survey.

Data	LBP of motorcycle taxi driver		P-value
	Yes	No	
Working/week (Days)			0.132
<3	0 (0)	4 (100.00)	
3 - 4	7(50.00)	7 (50.00)	
5 – 6	49 (60.49)	32 (39.51)	
Everyday	14 (66.67)	7 (33.33)	
Working characteristic (Hour/course)			0.000*
< 2	18 (33.96)	35 (66.04)	
2 - 4	11 (78.57)	3 (21.43)	
> 4	41 (77.36)	12 (22.64)	
Motorcycle brand			0.081
Honda (≤ 130cc.)	28 (66.67)	14 (33.33)	
Suzuki (≤ 130cc.)	13 (46.43)	15 (53.57)	
Yahama (≤ 115cc.)	28 (63.64)	16 (36.36)	
Kawasaki (≤ 150cc.)	1 (33.33)	2 (66.67)	
Other brand (≤ 150cc.)	0(0)	3 (100.00)	
Underlying disorder			0.002*
No	34 (43.04)	45 (56.96)	
Yes	36 (87.80)	5 (12.20)	
Smoking history			0.000*
Non-smoker	18 (36.73)	31 (63.27)	
Ex-smoker	12 (85.71)	2 (14.29)	
Currently smoker	40 (70.18)	17 (29.82)	
Drinking history			0.000*
Non-drinker	3 (9.09)	30 (90.91)	
Ex-drinker	20 (58.82)	14 (41.18)	
Currently drinker	47(88.68)	6 (11.32)	
Exercise habit			0.456
Never	29 (85.29)	5 (14.71)	
Sometimes (3-4 times/week)	27(47.37)	30 (52.63)	
Always (Everyday)	14(48.28)	15 (51.72)	
Injury history on the back			0.011*
No	55 (52.88)	49 (47.12)	
Yes	15 (93.75)	1 (6.25)	
Surgery history on the back			0.399
No	68 (57.63)	50 (42.37)	
Yes*	2 (100.00)	0 (0)	
Sleep pattern (Hours/night)			0.005*
< 8	50 (64.94)	27 (35.06)	
8 - 12	20 (46.51)	23 (53.49)	

*2 case of Cystectomy at the back

The result of multiple logistic regression analysis is to characterize the risk associated to LBP. These statistically different risk factors were analyzed simultaneously, which were also controlled 3 main risk factors: (1) individual risk factors comprise gender, height, weight, BMI and education degree. (2) occupational risk factors such as type of work, daily working hour and weekly. (3) health related factors including ongoing medical issues, smoking/drinking habit, exercise behaviors, back operation history,

sleep habit. The result also shows that the risk of LBP tend to increase with age. LBP typically occurred among the ages of 30 to 40 years old, which increased the risk 2.93 times (95%CI = 1.47 - 3.29 P-value = 0.044). For length of years spent on riding, it shows that 3 - 5 years of MTDs likely to increase the risk 2.26 times (95%CI = 1.07 - 4.52 P-value = 0.030). For an injury on the back, it shows the increasing of risk 29.97 times (95%CI = 2.90 - 51.55 P-value = 0.001) as shown in table 3.

Table 3. The risk factors associated to LBP via multiple logistic regression.

Data	Odds ratio	95% CI of Odds ratio	P-value
Individual factors			
Age (Years)			
20 – 30	1.00	Reference	
31 – 40	2.93	1.47 - 3.29	0.044*
41 – 50	0.93	0.21 - 3.10	0.288
>50	0.67	0.07 – 1.70	0.725
Occupational factor			
Working lifetime (Years)			
<3	1.00	Reference	
3 - 5	2.26	1.07 - 4.52	0.030*
>5 - 10	1.94	0.38-1.09	0.184
>10 - 20	0.67	0.27 - 1.18	0.163
>20	0.64	0.73 - 1.55	0.107
Health factor			
Injury history on the back			
No	1.00	Reference	
Yes	29.97	2.90 - 51.55	0.001*

The LBP in MTDs could affect working efficiency and ability of daily living. The results show that lifetime riding duration, smoking history, alcohol consumption and sleep pattern could affect the level of pain and limitation of activity. According to the smoking habits, the relationships of pain severity level and limitation of activity showed that smokers tended to have lower pain severity in average than non-smokers. Moreover, the highest level of pain occurred to those who had been smokers. The relationship of pain severity level and limitation of activity in drinking and smoking habits are relatively event. The respondents who had no back surgery before were likely to suffer less LBP than those who had the surgery. In addition, subjects who slept less than 8 hours a day had higher pain severity than those who slept 8 - 12 hours a day (Table 4).

Discussion

The results show the prevalence of LBP among MTDs in Sriracha was 58.3%, which correspond to the study of Akinbo SR *et al.*⁽¹⁵⁾ and Mirbod SM *et al.*⁽¹⁶⁾ They revealed that the prevalence of LBP among motorcyclists higher than other kinds of back pain due to the length of time spent in the same position, repetitive lifting, lack of back support in the motorcycle seat and the vibration from the engine, transferred to the riders.⁽¹⁰⁾

This study also shows several factors associated with LBP among MTDs in Sriracha. Individual risk factors such as gender, age and weight are illustrated in Table 1 and 2. Male drivers tended to suffer more LBP than their female counterparts because of their basic activity, workload and type of exercise, this shows higher risk of the male than female

Table 4. Comparison between pain severity and limitation of activity stage due to LBP with associated factors.

Data	Pain severity and limitation of activity stage due to LBP				
	N	\bar{x}	SD.	F.	p-value
Smoking history					
Non smoker	40	33.00	12.08	10.798	0.000*
Ex-smoker	12	50.33	10.54		
Currently smoker	18	32.67	12.04		
Drinking history					
Non drinker	47	31.45	10.86	15.300	0.000*
Ex-drinker	20	47.60	12.51		
Currently drinker	3	27.33	7.53		
Injury history on the back					
No	55	34.33	12.89	-1.794	0.087
Yes	15	41.60	14.19		
Sleep pattern					
< 8 hours per day	50	38.96	13.92	-4.011	0.000*
8 - 12 hours per day	20	28.20	8.15		

(same result as previous study).^(17,18) As for age-related factors, it was shown that degenerative disease was commonly found in the elderly⁽¹⁹⁾ but might not involve in LBP among the MTDs due to the age of MTDs mostly below 40 year old. Some studies revealed that lack of riding skill was crucial of LBP in youths. As for weight-related factors in LBP, the report was the same as the previous study of Bener A *et al*⁽²⁰⁾, i.e. obesity could cause LBP.

Full-time or part-time of MTDs did not show the difference in the pain severity of LBP and limitation of activity. It was possible that MTDs of full-time job and the part-timers had LBP as shown in the preceding studies.^(5, 9, 21 - 23)

The relationship between lifetime working duration of MTDs and limitation of activity due to LBP showed that longer years of riding could increase the pain severity and limitation of activity due to LBP, especially, those who had worked more than 10 years. The results are related to previous studies that higher time spent of work could increase the prevalence of LBP.⁽¹⁵⁾

Smoking habit could cause LBP, the evidences of which were supported by Deyo RA.⁽²⁴⁾ They claimed that smoking is the risk factor leading to LBP. The relationship between pain severity and limitation of activity due to pain showed that smokers tend to have the lowest severe pain and least limitation of activity due to LBP, followed by the non-smokers. However, highest severity level and highest limitation of activity due to the pain was ex-smokers. The study shows that smokers had the average of pain severity less than those who quit smoking as cigarettes increase the pain threshold⁽²⁵⁾, which could lead to lowering of the pain severity level.

Alcohol consumption was another possible factors of LBP, but previous studies^(26,27) did not have enough evidences to support and revealed that normal drinking habits were not related to LBP. However, excessive alcohol consumption or alcoholism could change the pain severity level and their limitation of activity due to LBP. Heavy drinkers had the lowest level of severity and limitation of activity, followed by the non-drinkers respectively. The highest level of pain severity and limitation of activity were found in those who quit drinking. In this case, it can be described that alcohol has analgesic effect⁽²⁸⁾, which decreases the average of pain severity and limitation of activity in the group of heavy drinkers and lower than non-drinkers and those who quit drinking respectively.

As for MTDs who had no back injury reported no different in severity level of LBP to MTDs with back injury. The result was contrasting to the previous studies⁽²⁹⁾, in which the persons who reported back injury showed the LBP symptom more than those without back injury report. It could be explained by the low number of subjects that had mild back injury.

Sleep pattern and sleep duration affected the pain severity and limitation of activity due to LBP, in which the respondents who regularly sleep less than 8 hours a day, had higher pain severity than the respondent with 8 -12 hours of sleeping time. The results from the Alsaadi SM⁽³⁰⁾ and the current results are similar. This revealed that the lack of sleep could increase the severity of LBP.

Conclusion

The prevalence of LBP among MTDs in Sriracha was 58.3%. The considered related factors

were individual associated factors (genders, ages and weights), work related factors (working duration in years, in hours and characteristics of work), and health related factors (ongoing medical issue, smoking, alcohol consumption, back injury report and sleep pattern). The pain severity at work and limitation of activity due to LBP was in the medium stage and no significant difference in pain severity at work and limitation of activity due to LBP among full-time and part-time MTDs.

The purpose of this study was to be a guideline to prevent LBP among MTDs and improve their quality of life including age-related factors in the young or adults. Overweight could also affect LBP. More suggestions about working duration may be officially announced in the future.

The limitation of this research was the area in Sriracha (limited area), which could not implement in the real population of MTDs in Thailand. In addition, a structured questionnaire could not cover all the criteria due to the limitation of human supply (researcher carried out all the self-administrated questionnaire, which could cause the bias from the respondents such as exaggeration, respondents could not precisely remember their working hours/ time or back injury). Lastly, the controls of the experiment was not considered well enough such as full-time/part time of motorcyclist and mind related factors such as stress during the work. All of these factors could lead to LBP among these subjects.

References

1. Chou R. Low Back Pain (Chronic). Am Fam Physician 2011;84(4):437-8
2. Cypress BK. Characteristics of physician visits for

back symptoms: a national perspective. Am J Public Health 1983 Apr;73(4):389-95

3. สำนักงานสถิติแห่งชาติ. บทสรุปสำหรับผู้บริหาร สัมมนาประชากรและเคหะพ.ศ. 2553 (รายงานผลล่วงหน้า). กรุงเทพฯ: สำนักงานสถิติแห่งชาติ, 2553
4. Luo X, Pietrobon R, Sun SX, Liu GG, Hey L. Estimates and patterns of direct health care expenditures among individuals with back pain in the United States. Spine (Phila Pa 1976). 2004 Jan 1;29(1):79-86
5. ประวิตร เจนวรธนะกุล, ปราณีต เพ็ญศรี, ธเนศ สิ้นส่งสุข, วิโรจน์ เจริญศรี, ศิริเพ็ญ ศุภกาญจนกันติ. ความชุกปัจจัยส่งเสริมและความสูญเสียทางเศรษฐกิจที่เกี่ยวข้องกับการเกิดอาการทางระบบกระดูกและกล้ามเนื้ออันเนื่องมาจากการทำงานในผู้ที่ทำงานในสำนักงานในสถานประกอบการในเขตกรุงเทพมหานคร. กองวิจัยและพัฒนาสำนักงานประกันสังคม, 2548
6. Pitayatiananan P, Butchon R, Yothasamut J, Aekplakorn W, Teerawattananon Y, Suksomboon N, Thavorncharoensap M. Economic costs of obesity in Thailand: a retrospective cost-of-illness study. BMC Health Serv Res 2014 Apr 2;14:146
7. นิพนธ์ พัวพงศกร. ทำไมจึงเกิดมอเตอร์ไซค์รับจ้างในกรุงเทพฯ [ออนไลน์]. ทีดีอาร์ไอสถาบันวิจัยเพื่อการพัฒนาประเทศไทย, 2537 [เข้าถึงเมื่อ 25 พ.ย. 2556]. เข้าถึงได้จาก: <http://tdri.or.th/publications/wb4/>
8. กองแผนงานกลุ่มสถิติการขนส่ง. รายงานสถิติการขนส่งประจำปี 2555 [ออนไลน์]. 2555 [เข้าถึงวันที่ 25 พ.ย. 2556]. เข้าถึงได้จาก: http://www.msociety.go.th/article_attach/9582/13425.pdf
9. Bovenzi M, Zadini A. Self-reported low back

- symptoms in urban bus drivers exposed to whole-body vibration. *Spine (Phila Pa 1976)* 1992 Sep;17(9):1048-59
10. Chen HC, Chen WC, Liu YP, Chen CY, Pan YT. Whole-body vibration exposure experienced by motorcycle riders— An evaluation according to ISO 2631-1 and ISO 2631-5 standards. *Int J Ind Ergon* 2009 Sep;39(5): 708-18
11. ธีรบุญย์ นิมนุสสรณ์กุล. ความน่าเชื่อถือของแบบสอบถามออกสเวสทรี (รุ่นที่ 1.0) ฉบับภาษาไทย ในการประเมินอาการผู้ป่วยปวดหลังเรื้อรัง. *วารสารการแพทย์โรงพยาบาลอุดรธานี*. 2551 ม.ค.-เม.ย.;16 (ฉบับภาคผนวก ข):622-7
12. Sanjaroensuttikul N. The Oswestry low back pain disability questionnaire (version 1.0) Thai version. *J Med Assoc Thai* 2007 Jul; 90(7): 1417-22
13. Sakulsriprasert P, Vachalathiti R, Vongsirinavarat M, Kantasorn J. Cross-cultural adaptation of modified Oswestry Low Back Pain Disability Questionnaire to Thai and its reliability. *J Med Assoc Thai* 2006 Oct; 89(10): 1694-701
14. สุรัชชัย แซ่จึ้ง, ทกมล ทรรษาวงศ์, กิตติ จิระรัตนโพธิ์ชัย. ความน่าเชื่อถือของแบบสอบถาม ออกสเวสทรี ฉบับภาษาไทย ในการประเมินอาการในผู้ป่วยปวดหลัง. *ศรีนครินทร์เวชสาร* 2545 ต.ค. - ธ.ค.; 17(4):247-53
15. Akinbo SR, Odebiyi DO, Osasan AA. Characteristics of back pain among commercial drivers and motorcyclists in Lagos, Nigeria. *West Afr J Med* 2008 Apr; 27(2):87-91
16. Mirbod SM, Inaba R, Iwata H. Subjective symptoms among motorcycling traffic policemen. *Scand J Work Environ Health* 1997 Feb;23(1):60-3
17. Omokhodion FO. Low back pain in a rural community in South West Nigeria. *West Afr J Med* 2002 Apr - Jun;21(2):87-90
18. Sagy I, Friger M, Sagy TP, Rudich Z. Gender-based differences in the management of low back pain]. *Harefuah* 2014 Jul;153(7): 380-4, 434
19. ชัยวัฒน์ ไกรวัฒนพงศ์. เอกสารคำสอนเรื่องอาการปวดหลังส่วนล่าง (Low Back Pain). กรุงเทพฯ: มหาวิทยาลัยมหิดล, 2555
20. Bener A, Alwash R, Gaber T, Lovasz G. Obesity and low back pain. *Coll Antropol* 2003 Jun; 27(1):95-104
21. Miyamoto M, Shirai Y, Nakayama Y, Gembun Y, Kaneda K. An epidemiologic study of occupational low back pain in truck drivers. *J Nippon Med Sch* 2000 Jun;67(3):186-90
22. Anderson R. The back pain of bus drivers. Prevalence in an urban area of California. *Spine (Phila Pa 1976)* 1992 Dec;17(12): 1481-8
23. Guo HR, Tanaka S, Halperin WE, Cameron LL. Back pain prevalence in US industry and estimates of lost workdays. *Am J Public Health* 1999 Jul;89(7):1029-35
24. Deyo RA, Bass JE. Lifestyle and low-back pain. The influence of smoking and obesity. *Spine (Phila Pa 1976)* 1989 May;14(5):501-6
25. Pauli P, Rau H, Zhuang P, Brody S, Birbaumer N. Effects of smoking on thermal pain threshold in deprived and minimally-deprived habitual smokers. *Psychopharmacology (Berl)* 1993;

- 111(4):472-6
26. Leboeuf-Yde C. Alcohol and low-back pain: a systematic literature review. *J Manipulative Physiol Ther* 2000 Jun;23(5):343-6
27. Ferreira PH, Pinheiro MB, Machado GC, Ferreira ML. Is alcohol intake associated with low back pain? A systematic review of observational studies. *Man Ther* 2013 Jun;18(3):183-90
28. James MF, Duthie AM, Duffy BL, Mckeag AM, Rice CP. Analgesic effect of ethyl alcohol. *Br J Anaes* 1978 Feb;50(2):139-41
29. คีลดา วงศ์ษา. ความชุกอาการปวดหลังของบุคลากรโรงพยาบาลพะเยา. *เพียงรายเวชสาร*. 2555;4(2):35-40
30. Alsaadi SM, McAuley JH, Hush JM, Lo S, Lin CW, Williams CM, Maher CG. Poor sleep quality is strongly associated with subsequent pain intensity in patients with acute low back pain. *Arthritis Rheumatol* 2014 May;66(5):1388-94