

CORRECT SEATBELT POSITIONING FOR PREGNANT CAR OCCUPANTS

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ABSTRACT

Correct seatbelt wearing is a prerequisite for the protection of a pregnant woman and her baby in the event of a crash. However, because of discomfort due to large abdomen and wrong belief, pregnant women may avoid using the safety belt or may wear it not according to the correct position as recommended. This research aims to assess the overall prevalence of seatbelt wearing and the proportion of correct seatbelt wearing among pregnant car occupants. A face-to-face interview survey was conducted on 503 pregnant car occupants in Klang Valley who are visiting pregnancy clinics for their monthly check-up. Seatbelt wearing rate among pregnant car occupants was recorded high for front occupant, 90% for driver and 85% for front passenger. However, rear passenger seatbelt compliance was low, only 24% reported always wearing seatbelt when they occupy the rear seats. Despite the high compliance rate of seatbelt usage among pregnant occupants, the correct positioning of the seatbelt was only 29% of overall respondents. The findings of the study suggest low percentage of correct seatbelt usage among pregnant occupants could increase the risk of injury in event of a crash. Thus, awareness and educations needed to advocate pregnant lady on the correct adjustment of seatbelt.

Keywords: seatbelt, pregnant occupant protection, pregnancy, traffic safety

INTRODUCTION

Automotive restraint systems especially seatbelt and airbag have been proven effective in reducing injuries and fatalities from road crashes¹. Since rear seatbelt law has been implemented in Malaysia on 1 Jan 2009, public awareness on the importance of seatbelt wearing in reducing road traffic fatality and severe injury in an event of a crash has improved significantly². Pregnant women are particularly concern about their baby safety when traveling using a car. It is reasonable to expect wider use of seatbelts by expectant mothers due to this acute attention to safety³. However, some women misleadingly believe in fear that seatbelts may cause injury to the foetus by applying excessive pressure against the abdomen during car collision or even causes a subsequent premature delivery. This wrong believe influenced their practice on seatbelt wearing. Nevertheless, there is no scientific evidence to support that claim. Instead, researchers had reported on injuries suffered by pregnant women or their foetuses when they are not belted in the event of a crash^{4,5}.

The lack of data on safety of pregnant women and their foetuses in car crashes has resulted in much misinformation. This is due to small number of population of pregnant women and hence, the study on the importance of using seatbelt during pregnancy has not been given due recognition⁶. In fact, awareness on the importance of passive safety towards safer pregnant occupants are truncated. A study on the pregnancy magazines' contents shows that the amount of information on seatbelt use during pregnancy was low⁷. Pregnant women are still in doubt if a seatbelt is helpful in a car accident or if it might injure the unborn baby

in some way³. They are unaware of the real risks of not using this basic protection system.

A few studies demonstrate that incorrect usage of seatbelts is a cause of injury^{4,5,6}. This can be especially applicable during pregnancy when changes in anatomy dictate a change in belt positioning. A study in the United Kingdom reported that only 13% of pregnant women wear their seatbelt in the correct position as prescribed by NHTSA's guidance⁸. The aim of this article is to determine the prevalence of seatbelt wearing among pregnant car occupant and to report the rate of correct seatbelt wearing among them.

METHODS

A semi-structured questionnaire entitled 'Pregnancy and Driving'⁹ was adopted and translated into Malay language. The validated questionnaire then used to collect information on pregnant car occupants' demographics and automobile restraints practice. The interview survey among pregnant car occupants was held at antenatal clinics in Klang Valley. The inclusion criteria for selection of the respondents were pregnant women with gestational age between 5 and 40 weeks. Conversely, respondents with gestational age of below 5 weeks or those who had physical impairment (upper and lower limbs which affect driving posture) were excluded from the survey. A multistage, stratified, clustered sampling was used to select the eligible pregnant respondents. 4 strata across Klang Valley were constructed based on the geographical location, and clusters (also based on geographical area) were drawn from within the stratum. Antenatal clinics were then randomly selected from within each cluster. Eligible pregnant women within the

inclusion criteria were randomly selected as they arrive at the clinics.

Locations of the study were specifically selected from areas in Klang Valley which comprises Federal Territory of Kuala Lumpur and four adjoining districts of Selangor namely Petaling Jaya, Klang, Gombak and Hulu Langat. However, Federal Territory of Kuala Lumpur was omitted from the survey due to logistic and cost constraints. Furthermore, only four municipalities (from a total of eight) were randomly selected to ensure that the sample for this survey was representative of the study locations. From the chosen municipalities, one antenatal clinic for each municipality was then selected.

The sample size calculation for the survey was carried out using PS Power and Sample Size Calculations version 3.0.43. Total pregnant women in 2011 in Malaysia is approximately 565,072 persons as reported by Health Informatics Centre, Ministry of Health Malaysia (MOH), while in Selangor, the population is about 115,543¹⁰. For this study, an expected frequency of 50% of pregnant women were assumed to wear seatbelt with worst acceptable 45-55% (with $\pm 5\%$ precision). At 95% confidence level, the sample size was calculated to be 384. By taking into account an increase of 20% (non-response), the sample size was then determined to be 480.

Prior to the interview, the respondents were explained about the study's procedure and objectives. In addition, they were informed that the information collected is confidentiality. Only those who consented was recruited as a study subject. Two appointed trained research assistants were tasked to interview the respondents. Data collection was completed within one-month period from mid-August to mid-September 2014.

The content of the questionnaire was designed based on literature reviews^{8,9} and study needs and was examined for face and content validity. Questions about all aspects of car travel both as drivers and as passengers were included in the questionnaire. The questions regarding seatbelts were particularly designed to understand the level of 'correct usage' of the restraint systems. The respondents were asked about their seatbelt wearing and specifically on how the shoulder and lap portions of the 3-point seatbelt were positioned while being restrained. In addition, questions about their experiences of airbags and head restraints usage whilst pregnant were asked during interview. Reviews of both relevance and content of the questionnaire were carried out by public health experts and researchers in road traffic injury prevention and behaviour research, respectively.

Data entry was performed by trained research assistants into database using IBM Statistical Package for Social Science (SPSS) software version 20. The entered data was properly verified by a researcher to ensure any missing important information was dealt with prior to data analysis. Descriptive and crosstab analyses were carried out for the survey data corresponding 95 percent confidence intervals (95% CI).

RESULTS

This section tabulates the result of the survey from sociodemographic, prevalence of seatbelt wearing among pregnant women, problem they are having when using the seatbelt and rate of seatbelt misuse.

Sociodemographic profile

The interview survey was participated by 503 pregnant respondents. Table 1 shows the sociodemographic of the respondents. The mean age was 29.41 (min = 16 years old, max = 43 years old) SD = 4.66 and the mean of respondents' pregnancy stages is 25.81 week, SD = 8.11 (min 5 weeks, max 40 weeks). Education level shows majority of the respondents had attained a diploma or higher degree. 72% of the respondents are driver.

There were none of the sociodemographic variables showed significant relationship towards seatbelt wearing during pregnancy. This shows that, sociodemographic factors do not influenced the seatbelt wearing practice among pregnant women.

Seatbelt wearing rate

Table 2 shows the seatbelt wearing rate, the reasons of not wearing seatbelt among pregnant women and difficulties. In this section, each pregnant woman was allowed to answer from the driver point of view if they are driving, and/or they are on the passenger seat. Out of 363 drivers, 90% of the respondent wore their seatbelt when they are driving. In contrast, 85% of the respondent wore seatbelt when they occupied the front passenger seat. However, the seatbelt wearing rate was very low for rear occupant (24.6%). In addition, the drivers and front passengers choose not to wear seatbelt during pregnancy mostly because they feel uncomfortable wearing it.

Most of the respondents, regardless of their seating position, reported 'there is no problem' to the question regarding problems or any difficulties having while wearing seatbelt during pregnancy. The highest difficulty faced by the respondents were the seatbelt is tight on the abdomen (29% of driver, 25.8% of front passenger and 21% of rear passenger).

Table 1 - Pregnant respondents' sociodemographic distribution

Variables	Total respondents, N (%)	Seatbelt wearing during pregnancy		p-value (95% CI)
		Yes (%)	No (%)	
Age Group				
15-20	13 (2.6)	11 (84.6)	2 (15.4)	0.467
21-30	296(58.8)	268 (90.5)	28 (9.5)	
31-40	186(37.0)	168 (90.3)	18 (9.7)	
41-50	8(1.6)	6 (75)	2 (25)	
Pregnancy Stages				
1 st Trimester	22 (4.4)	140 (94.6)	8 (5.4)	0.810
2 nd Trimester	287 (57.1)	175 (88.8)	22 (11.2)	
3 rd Trimester	194 (38.6)	138 (87.3)	20 (12.7)	
Education Level				
UPSR	9 (1.8)	8 (88.9)	1 (11.1)	0.826
PMR	28 (5.6)	25 (89.3)	3 (10.7)	
SPM	148 (29.4)	130 (87.8)	18 (12.2)	
STPM/ DIPLOMA	161 (32.0)	148 (91.9)	13 (8.1)	
DEGREE	157 (31.2)	142 (90.4)	15 (9.6)	
Profession				
Housewife	177 (35.2)	158 (89.3)	19 (10.7)	0.252
Support Staff	113 (22.5)	101 (89.4)	12 (10.6)	
Professional	127 (25.2)	120 (94.5)	7 (5.5)	
Self- employed	41 (8.2)	34 (89.2)	7 (17.1)	
Others	45 (8.9)	40 (88.9)	5 (11.1)	
Monthly income (RM)				
<3,000	186	161 (86.6)	25 (13.4)	0.065
3,000 - 4,999	100	96 (96)	4 (4)	
5,000 - 9,999	29	27 (93.1)	2 (6.9)	
>10,000	3	3 (100)	-	
Driving				
Driver	363 (72.2)	327 (90.1)	36 (9.9)	0.978
Passenger	140 (27.8)	126 (90.0)	14 (10.0)	

Table 2 - Pregnant respondents' seatbelt wearing behaviour

Pregnant women travel as:	Driver (N=363) % (95 CI)	Front passenger (N=501) % (95 CI)	Rear passenger (N=187) % (95 CI)
Seatbelt wearing rate			
Yes	90.1 (87.0-93.2)	85.0 (81.9-88.2)	24.6 (18.4-30.8)
No	9.9 (6.8-13.0)	15.0 (11.9-18.1)	75.4 (69.2-81.6)
Reasons			
Uncomfortable	80.6 (67.6-93.5)	70.7 (60.4-81.0)	31.2 (23.6-38.9)
Risk to foetus	0	2.7 (0-6.3)	0.7 (-0.7-2.1)
No reason	0	5.3 (0.3-10.4)	44.0 (35.8-52.2)
Others	19.4 (6.5-32.4)	21.3 (12.1-30.6)	24.1 (17.1-31.2)
Difficulty			
No difficulties	54.4 (49.0-59.8)	59.2 (54.5-63.8)	65.2 (51.5-79.0)
It is difficult to adjust & fasten	11.3 (7.8-14.8)	9.2 (6.4-11.9)	10.9 (1.9-19.9)
The belt is tight on my abdomen	29.1 (24.1-34.0)	25.8 (21.7-30.0)	21.7 (9.8-33.7)
The belt is too tight on my chest	4.0 (1.9-6.1)	3.5 (1.8-5.3)	2.2 (-2.0-6.4)
The belt is too tight on my hips	1.2 (0.3-2.4)	2.4 (0.9-3.8)	0

Proper seatbelt wearing rate

Table 3 shows the pregnant respondents seatbelt practice, the way they place their lap and shoulder belt. This section segregated between the driver and passenger response. In this section, when the pregnant woman answered the driver section, we only consider them as driver. Otherwise, we consider them as passenger. From the interpolation, it was found that only 26.6% of the occupant wear seatbelt perfectly correct as illustrated in Figure 1. The seatbelt must be properly fastened. Secure the lap belt below abdomen, low and snug on the hipbones. Never wear the belt across or above the abdomen and the shoulder belt should fit snugly between the breasts^{6,11}.

Table 4 depicts the bivariate correlation between sociodemographic variables of the respondents on properness of them wearing their seatbelt. The

analysis shows that pregnancy stage by number of trimester, profession and also monthly income of the pregnant respondents have statistical significant relationship.



Figure 1 - Proper seatbelt wearing for pregnant women¹¹

Table 3 - 3-point seatbelt position for all pregnant respondents

PREGNANT OCCUPANTS N=503	LAP BELT			
	Across upper thighs	Across hips underneath abdomen	Across abdomen	Not using lap belt
Above both breasts	7 (1.4)	35 (7.0)	12 (2.4)	3 (0.6)
Across one breast & across abdomen	16 (3.2)	119 (23.7)	76 (15.1)	4 (0.8)
SHOULDER BELT				
Between breasts & around abdomen	13 (2.6)	134 (26.6)	31 (6.2)	4 (0.8)
Off shoulder & around abdomen	6 (1.2)	14 (2.8)	9 (1.8)	0
Not using shoulder belt	0	0	0	0
Using stopper clip	4 (0.8)	8 (1.6)	8 (1.6)	0

Table 4 - Bivariate analysis of proper seatbelt position of pregnant respondents with their sociodemographic characteristics

Variables	Chi-square	p-value	Significance with proper seatbelt wearing (p<0.05)
Age Group	3.90	0.273	No
Pregnancy Stages	15.13	0.001	YES
Education Level	1.10	0.894	No
Profession	9.43	0.051	YES
Monthly income	14.86	0.002	YES
Driving	0.145	0.703	No

DISCUSSION

This study determined the prevalence of seatbelt wearing rate among pregnant women and the way they adjusted the belt in Klang Valley. Seatbelts are designed to retain people in their seats during a crash, and to prevent or reduce injuries. They minimise contact between the occupant and

vehicle interior and significantly reduce the risk of being ejected from the vehicle. Pregnant women are also beneficiary of seatbelt and airbag design when they wearing it properly^{12,13}. Klinich et al. (2008) suggested that restraint by an airbag with shoulder and lap belt leads to fetal outcomes that are as good as a restraint by the seatbelt alone¹⁴, in other word, airbag do not appear to

worsen fetal outcomes. It is proven that seatbelt is useful in mitigating the occurrence and severity of maternal crashes and subsequent injuries^{13,14,15}.

Seatbelt wearing rate among pregnant women recorded by the study is 90%. This finding is higher compared to the study by Pearlman and May (1996) in which 68% of their respondents reported using seatbelt during pregnancy¹⁵. Furthermore, the distribution of seatbelt wearing rate among pregnant women by type of occupant revealed that about 90% and 85 % of drivers and front passengers worn seatbelt respectively. However, the seatbelt wearing rate is very low for rear passengers as only 25% of the pregnant women worn seatbelt. The seatbelt wearing pattern is consistent with the finding of the nationwide roadside observation in 2014 which reported that the seatbelt wearing rate among female drivers and front passengers were higher compared to female rear passengers with the percentage of 81%, 71% and 8%, respectively¹⁶. The wearing rate was observed higher among pregnant women as supported by other studies which reported higher seatbelt wearing during pregnancy as compared to before pregnancy^{17,18}. The high wearing rate among pregnant women might be due to their belief that wearing seatbelt could be beneficial to them and their foetus¹⁹. This was proven by a study by Schiff and her colleague (1992) which found that about 59% of women wear seatbelt during their pregnancy to prevent injury to themselves, followed by because it is required by the law and to prevent injury to their foetus by 49% and 48%, respectively¹⁷.

The study also investigate the reasons of not wearing seatbelt among the respondents and revealed that the most commonly reported reason for not wearing seatbelt when they were driver, front passenger or rear passenger was due to comfort problem (78%, 71% and 31%, respectively). The finding is consistent with other studies which reported that the most contributing factor on lack of seatbelt wearing was due to lack of comfort^{20,21}. Respondents commonly expressed concern that the seatbelt was tight around their abdomen. This also shows the importance of comfort whilst using the seatbelt, since it can influence whether or not a woman will be using the seatbelt.

A common problem was that the lap portion of the seatbelt tend to ride up onto the abdomen during car travel, even after it was placed correctly across the hips at the start of the journey. Many women took action to prevent the lap belt from contacting the pregnant abdomen in order to protect the fetus or to make themselves more comfortable. Some women hold the belt away from the bump with their hands, or by using the shoulder belt clipper. Similarly, women were also holding the belt away from their neck because it was rubbing and cutting their neck. They were not

aware that by holding the belt away could create slack in the belt and may increase the risk of injury²².

From the data, only 24.6% of the respondents wear the seatbelt correctly for both shoulder and lap portion of the seatbelt as suggested in previous study^{6,11}. The percentage of incorrect seatbelt wearing was very high among pregnant respondents (75.4%). As discussed earlier, incorrect positioning of seatbelt could cause fatal injury to the mother and to the foetus^{8,15,23}. This study shows that more than half of pregnant women are ignorant of the correct use of a seatbelt, which may puts them at higher risk for sustaining injuries in an event of a crash.

CONCLUSION

In conclusion, this study findings highlights the need for awareness program to address the issues of incorrect seatbelt wearing among pregnant women. Health education during antenatal check up could be one of the best opportunity to deliver the message to the pregnant women. In addition, a more comprehensive awareness and advocacy program to target childbearing age and pregnant women is also needed.

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