ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
Index Copernicus Value : 49 . 23

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 3, Issue –2, March - 2018, Page No. : 78 - 84

Association of Smoking with Motor Vehicle Injuries in Elderly

Dr. Rakesh Reddy Adumala, MBBS, MPH, DrPH

Post Graduate, Department of General Medicine, Yenepoya Medical College, Derlakatte, Mangalore, India

Dr. CP Abdul Rehman, MD

Professor, Department of General Medicine, Yenepoya Medical College, Derlakatte, Mangalore, India

Correspondence Author: Dr. Rakesh Reddy Adumala**,** Post Graduate, Department of General Medicine, Yenepoya Medical College, Derlakatte, Mangalore, India

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Objective

With increasing elderly population, the number of elderly individuals experiencing motor vehicle injuries is likely to increase. There is a need to identify and address risk factors contributing to it. With current smoking as a risk factor for wide range of effects on human body, the need to investigate any association of current smoking with motor vehicle injury becomes even more pressing.

Methods

Data from Medical Expenditure Panel Survey (MEPS) was used for study. The sample included individuals aged 65 years and above from 2002 to 2007 years. The primary outcome variable of interest was 'Motor Vehicle Injury'. The primary independent variable of interest was 'Currently Smoke'. Multivariate Random effects logistic regression model was used for analysis.

Results

People who currently smoke were significantly more likely to have motor vehicle injuries ([OR] = 1.674; 95% CI, 1.033 to 2.714) compared to people who were not current smokers.

Conclusion

Current smoking is associated with motor vehicle injury in the elderly.

Introduction

While accidents account for 20% of morbidity and mortality, about half of the injuries are attributable to road traffic accidents[1,2]. Elder drivers are at higher risk for motor vehicle accidents per mile driven[3]. As per US census Bureau report[4], 2011 and Institute of Medicine report[5], 2008, elder population in the U.S. is expected to increase over the next few years. So the elder people involvement in motor vehicle accidents is expected to increase. Compared to younger drivers, elder drivers are at higher risk of dying when involved in accident[6].

As per the report of National Highway Traffic Safety Administration[7] (NHTSA), (1998), most often, the elder drivers are at fault in the crashes in which they are involved. Increased time to react or diminished vision are shown to be involved in errors made by elder drivers[8,9] resulting in fatal accidents at unregulated intersections[10]. Compared to middle aged drivers, elderly drivers are more likely to experience fatal accidents on roads with low speed limit, on straight roads and in day light[10]. Elder drivers are more likely to experience "vehicle – vehicle collision" over "vehicle object" or "non-collision" accidents[10,11] indicating the need to address general public safety.

As reported by NHTSA[7], 1998, accidents involving elderly commonly occur at road intersections, when changing direction or merging into a flow of traffic implying elder individuals might have difficulty executing tasks that need complex decisions[12]. Decreased cognitive, sensori-perceptual and motor functioning resulting in inability to properly turn vehicle, yield right-of-way and obey traffic signals were cited as reasons for accidents in the elderly[10].

As per CDC report[13], 2005, the prevalence of current smoking aged over 65 years was 8.9% for men and 8.3% for women. Nicotine from cigarette smoking produces stimulant effect when small, quick puffs are taken and relaxant effect when deep puffs are taken[14]. By enhancing actions of norepinephrine and dopamine on brain, nicotine produces psychostimulant effect and by enhancing actions of serotonin and opiates, nicotine produces relaxant effect[14]. Therefore this study was done to know if current smoking is associated with motor vehicle injuries in the elderly.

Methods

Data

Medical Expenditure Panel Survey[15] (MEPS) was the source of data (MEPS data files). As the Study was done based on analysis of openly available secondary data, ethical clearance was not obtained. MEPS contains nationally representative estimates of health care use, expenditures, payment sources and insurance coverage for the U.S. non-institutionalized civilian population. MEPS[15] has three surveys – The Household component (HC) is the main survey and forms the basis for the Medical Provider Component (MPC) and part of the Insurance Component (IC). Two files of the HC were used as source of data for this study. They are the Consolidated file and the Medical Conditions file.

The two year panel design of MEPS HC[15] is collected through a preliminary contact followed by five rounds of interviews over two and a half years. Data collection is done each year on a new sample panel of households and annual data is obtained by combining data from the first year of the new panel with that from the second year of the previous panel[15].

Variables

The primary dependent variable of interest was 'Motor Vehicle Injury'. The primary independent variable of interest was 'Currently Smoke'. Barring the variables of age and individual total income, the rest of the variables are all dichotomous. The commonly adjusted variables in the multivariate logit model include: Age, Bachelors degree or higher, Widowed / Divorced / Separated / Never Married, Male, Black, Asian, Other, Hispanic, High Blood Pressure, Coronary heart disease, Angina, Myocardial Infarction (MI), Other heart disease, Emphysema, Chronic Bronchitis, Epilepsy, Stroke, Diabetes, Asthma, Arthritis, Blind, Deaf, Cognitive limitations, Poor health status, Person's total income / 1000, Currently smoke, Physical Activity and Obese. Variables 'Motor Vehicle Injury' 'Epilepsy' and 'Chronic Bronchitis' were obtained from Medical Conditions file. The rest of the variables were obtained from the Full year Consolidated file.

The variables were defined as following (MEPS data files): Variable 'Poor Health' was obtained from the 'Perceived health status' variable. If 'Perceived health status' was rated as 'Poor' by the respondents in any round of the interview, 'Poor Health' was marked as 'Yes' otherwise 'No'. Collected at the family level, variable 'Cognitive limitations' was marked as 'Yes' if respondents answer to any of the following three-part question was 'Yes': (i) have confusion or loss of memory, (ii) have difficulty making decisions, or (iii) need supervision for safety. Variable 'Blind' was obtained from

'VISION42' variable and marked as 'Yes' if respondents specifically rated their vision as 'Blind' otherwise 'No'. Proxy household representatives have responded for cognitively impaired individuals.

Variable 'Deaf' was obtained from 'HEARING42' variable and marked as 'Yes' if respondents specifically rated their hearing as 'Deaf' otherwise 'No'. Variable 'Other race' consists of American Indian / Native Hawaiian / Alaska Native / Pacific Islander / Multiple races. If Body Mass Index (BMI) is greater than or equal to 30, variable 'Obese' is marked as 'Yes' otherwise 'No'. If respondents participated in moderate / vigorous physical activity at least three times per week, variable 'Physical Activity' was marked as 'Yes' otherwise 'No'.

Variable 'Motor Vehicle Injury' was created based on answer to the following set of questions: "Was the condition due to an injury or accident?" If the answer to the question was 'Yes', then the following question was asked: "Was a motor vehicle involved?" If the answer was 'yes', then 'Motor Vehicle Injury' variable was marked as 'yes', otherwise 'No'. Similarly Yes/No was marked based on responses for the following question: "Have you ever been diagnosed with" High Blood Pressure, Coronary Heart disease, Angina, MI, Other heart disease, Stroke, Diabetes, Emphysema, Asthma, Arthritis.

Analytic Design

By including only the elderly (greater than or equal to 65 years age), sample from years 2002 to 2007 was used for this study. The consolidated data file and Medical Conditions file for each respective year from 2002 to 2007 was merged after cleaning the data. Appending of the files for all years was done after merging. Random effects logistic regression model was done for analysis. Both bivariate and multivariate analyses were done using Stata 11 statistical software.

Results

The sample consisted of people representing the U.S. elderly population. As seen in Table 1, there were more females than males. White race comprised the majority compared to other races. About half of the sample was widowed / divorced / separated / never married. A fifth of the sample had Bachelor's degree or higher education. Vehicle injury was present in about 2% of the sample and people who currently smoke constituted about 11% of the sample.

Table 1. Socio-demographics and co-morbidities/health status of people aged 65 years or older, MEPS 2002 – 2007.

Variables	Yes	%	Mean
Socio-demographic			
Male	9283	41.10	
White	18337	81.18	
Black	3108	13.76	
Asian	732	3.24	
Other	411	1.82	
Hispanic	2910	12.88	
Age			74.42
Individual's total income / 1000			21.84
Widowed	11025	48.84	
Bachelor	4601	20.56	
Co-morbidities/health status			
Motor Vehicle Injury	398	1.83	
Currently Smoke	2299	11.22	
High blood pressure	14184	64.11	
Coronary heart disease	2865	13.00	
Angina	1768	8.02	
MI	2453	11.10	
Other heart disease	3611	16.38	
Stroke	2292	10.36	
Emphysema	1130	5.10	
Chronic Bronchitis	182	0.84	
Diabetes	4612	20.81	
Arthritis	11659	52.86	
Asthma	2111	9.53	
Blind	191	0.85	
Deaf	275	1.22	
Cognitive limitations	4108	18.54	
Atherosclerosis	103	0.47	
Other Peripheral Vascular Disease	70	0.32	
Physical activity	10129	45.84	
Obese	5459	25.12	

Epilepsy	64	0.29
Cancer	2,546	11.71
Poor health	3323	14.98

Bivariate logistic regression analysis results showed people who currently smoke were significantly more likely to have motor vehicle injuries ([OR] = 1.61; 95% CI, 1.03 to 2.52) compared to people who were not current smokers. As seen in Table 2, results from multivariate logistic regression analysis showed people who currently smoke were significantly more likely to have motor vehicle injuries ([OR] = 1.674; 95% CI, 1.033 to 2.714) compared to people who were not current smokers.

Table 2. Multivariate Random Effects logit model for Motor Vehicle Injury vs Currently Smoke

	Motor Vehicle Injury
Currently smoke	1.682* [1.037,2.728]
Age	0.976 [0.949,1.003]
Bachelors degree or higher	1.052 [0.689,1.607]
Widowed / Divorced / Separated / Never Married	1.135 [0.797,1.616]
Male	0.936 [0.653,1.341]
Black	0.849 [0.506,1.426]
Asian	1.551 [0.636,3.782]
Other	1.583 [0.537,4.667]
Hispanic	1.273 [0.776,2.088]
Individual's total income / 1000	1.001 [0.994,1.009]
Poor health	1.319 [0.843,2.063]
Physical Activity	1.172 [0.849,1.617]
Obese	1.125 [0.775,1.632]
Blind	1.486 [0.346,6.389]
Deaf	3.378* [1.243,9.182]
High Blood Pressure	0.824 [0.585,1.162]
Coronary Heart Disease	0.906 [0.528,1.553]
Angina	1.669 [0.952,2.928]
MI	0.796 [0.450,1.410]
Other heart disease	1.289 [0.865,1.923]
Stroke	1.455 [0.899,2.357]
Emphysema	0.456 [0.204,1.017]
Chronic Bronchitis	0.415 [0.054,3.191]
Asthma	1.648* [1.003,2.707]

Diabetes	0.987 [0.658,1.481]
Arthritis	1.346 [0.973,1.861]
Cognitive limitations	1.461 [0.961,2.223]
Epilepsy	3.457 [0.378,31.619]
Atherosclerosis	0.397 [0.027,5.927]
Other Peripheral Vascular Disease	1.908 [0.221,16.454]
Cancer	0.475* [0.264,0.853]
N	18602

Exponentiated coefficients; 95% confidence intervals in brackets $^{*}p< 0.05$, $^{**}p< 0.01$

Individuals with asthma were significantly more likely to have motor vehicle injuries ([OR] = 1.648; 95% CI, 1.004 to 2.706) compared to individuals without asthma. People with deafness were significantly more likely to have motor vehicle injuries ([OR] = 3.391; 95% CI, 1.249 to 9.209) compared to people who were not deaf. People with cancer were significantly less likely to have motor vehicle injuries ([OR] = 0.475; 95% CI, 0.264 to 0.853) compared to people without cancer.

Discussion

Consistently similar results in this panel data study showing significant increase in motor vehicle injuries from current smoking were observed in both bivariate analysis and multivariate analysis. Much of the health effects of smoking that were previously studied involved effect on smoker's health. But this study could have important policy implications as motor vehicle accidents jeopardize general public safety leading to significant morbidity, mortality and economic damage.

Particular strength of this study includes using panel data features of MEPS which represents U.S. population. Recall bias from self-reported data could be a limitation but a study by Agency for Healthcare Research & Quality (AHRQ) staff showed very strong agreement between household and provider reported conditions at the ICD-9-CM level[16,17]. Second, Individuals that did not seek medical attention for injuries may not have been included. Third, Although "current smoking" the smoking status may not be current at the time of injury since this is a 2 year panel data study (each individual is surveyed for 2 consecutive years) although attrition could be a limitation of panel data. Fourth, Average number of miles driven by individuals could not be accounted. Whether 'current smokers' drive more miles which might increase the risk of motor vehicle injuries needs further study. Fifth, in this study current smoking was found to be associated with Motor vehicle injuries but that does not necessarily imply current smoking was associated with increased motor vehicle accidents, collisions or crashes. Whether current smoking makes people more vulnerable to injuries from vehicle accident needs further study.

Other things that may further need to be studied include: pattern of smoking; any relation to driving -- smoking while driving, before, after or unrelated to driving; passive smoking (driver or non-driver); duration of smoking; content smoked; number of cigarettes smoked. Such understanding may help in better management of the problem. Studying the reason(s) behind association of cancer with decreased motor vehicle injuries would be of interest. If smoking is directly causing motor vehicle accidents or injuries, then preventive measures need to be adopted. Besides educating public, implementing laws and regulations may need consideration.

In conclusion, this panel data study showed significantly increased motor vehicle injuries to be associated with current smoking in the elderly. Further studies are needed to understand the details and cause-effect relationship in order to better address the problem.

Declarations

Funding: None

Conflict of Interest: Nil

References

1. Voyer P. [Road security and aging: how to prevent accidents]. *Perspect Infirm*. 2004 Sep-Oct;2(1):27-32.

2. Kong LB, Lekawa M, Navarro RA, McGrath J, Cohen M, Margulies DR, Hiatt JR. Pedestrian-motor vehicle trauma: an analysis of injury profiles by age. *J Am Coll Surg*. 1996 Jan;182(1):17-23.

3. Li G, Braver ER, Chen LH. Fragility versus excessive crash involvement as determinants of high death rates per vehicle-mile of travel among older drivers. *Accid Anal Prev*. 2003 Mar;35(2):227-35.

4. "The Older Population: 2010". U.S. Census Bureau. November 2011.

5. Institute of Medicine. Retooling for an aging America: Building the healthcare workforce. In. Washington, DC: The National Academies Press; 2008.

6. Lyman S, Ferguson SA, Braver ER, Williams AF. Older driver involvements in police reported crashes and fatal crashes: trends and projections.*Inj Prev*. 2002 Jun;8(2):116-20.

7. National Highway Traffic Safety Administration. Crash data and rates for agesex

groups of drivers, 1996. Washington, DC: US Department of Transportation, 1998.

8. Mori Y, Mizohata MCharacteristics of older road users and their effect on road safety. *Accid Anal Prev*. 1995 Jun;27(3):391-404.

9. Hakamies-Blomqvist LE. Fatal accidents of older drivers. *Accid Anal Prev*. 1993 Feb;25(1):19-27.

10. Zhang J, Fraser S, Lindsay J, Clarke K, Mao Y. Age-specific patterns of factors related to fatal motor vehicle traffic crashes: focus on young and elderly drivers. *Public Health*. 1998 Sep;112(5):289-95.

11. Sjögren H, Björnstig U, Eriksson A, Sonntag-Öström E, Öström M. Elderly in the traffic environment: analysis of fatal crashes in northern Sweden. *Accid Anal Prev*. 1993 Apr;25(2):177-88.

12. Abou-Raya S, ElMeguid LA. Road traffic accidents and the elderly. *Geriatr Gerontol Int*. 2009 Sep;9(3):290-7. doi: 10.1111/j.1447-0594.2009.00535.x.

13. Tobacco Use Among Adults: United States, 2005, Centers for Disease Control and Prevention, October 27, 2006

14. Current, J.D. *Pharmacology for Anesthetists 5: Cholinergics and Anticholinergics*: PediaPress; n.d.

15. Medical Expenditure Panel Survey. http://meps.ahrq.gov/mepsweb/.

16. Krauss, N., Kass B. “Comparison of Household and Medical Provider Reports of Medical Conditions.” Paper presented at the Joint Statistical Meetings, Indianapolis, Indiana. 2000.

17. Olin, G., Machlin, SR., Rhoades, J. Estimating the Cost of Illness: The Case of Diabetes. Agency for Healthcare Research and Quality Working Paper No. 08001. 2008.