A Comparison of Drug Use by Fatally Injured Drivers and Drivers at Risk

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Abstract

Research has documented the prevalence of drug use among drivers involved in serious crashes. Although the overrepresentation of alcohol among drivers involved in serious crashes has been repeatedly demonstrated in numerous studies, relatively few studies have attempted to determine the magnitude of the risks posed by drivers who have used drugs. The purpose of this study was to examine the extent to which drugs may present a risk to road safety by comparing the prevalence of drug use among drivers at risk and drivers who die in motor vehicle crashes.

Data on alcohol and drug use from coroners' and medical examiners' files on drivers of motor vehicles who died in crashes were compared with data on drug use among drivers who participated in roadside surveys in British Columbia, Canada conducted between 2008 and 2012 as a means to help establish the contributory role of drugs in driver fatalities. The results show increased probability of fatal crash associated with the use of alcohol or drugs and greatly increased risks associated with the use of alcohol and drugs in combination. Alcohol remains a primary substance of concern for road safety. Cannabis also presents increased risks for drivers as does the combined use of cannabis and alcohol. These findings will contribute to program and policy initiatives to improve road safety.

Background

The recent surge in interest in the issue of drugs and driving has prompted numerous experimental studies to determine the degree of impairment associated with drug use as well as epidemiological studies to determine the extent of drivers' use of psychoactive substances. But descriptive epidemiological studies can only determine the prevalence of drug involvement among drivers. Analytic epidemiological studies are required to establish whether, and to what extent, drivers who have used drugs are at increased risk of crash involvement.

The general approach is to use a case-control design or conduct a responsibility/culpability analysis to compare the incidence of drug use in a control population of drivers at risk with the incidence of drug use in a population of cases – i.e., drivers involved in, or responsible for, a crash. The extent to which drugs are more frequently detected in the population of cases provides an indication of the degree of risk posed by driver drug use. These types of studies have been instrumental in understanding the risks associated with various levels of alcohol use by drivers (e.g., Bloomberg et al. 2009; Borkenstein et al. 1964).

A number of studies have examined the possible overrepresentation of drugs in serious crashes. A recent review of these studies (Beirness, Logan and Swann 2010) revealed a wide range of findings, with some studies showing significantly increased risks for some substances and some showing no increase in risk. To some extent, the differences in findings could be attributed to the wide variety of approaches used along with differences in samples sizes, response rates,

sample medium, and analytical methods. Consequently, the studies provide mixed evidence on the risks associated with drug use by drivers. These studies do, however, provide consistent evidence on the increased risks associated with the use of a combination of alcohol and drugs that exceeds the risks of using either one alone.

Aims

The purpose of the present study was to compare the alcohol and drug use among fatally injured drivers with that among drivers who participated in random roadside surveys in British Columbia to determine the extent to which drug use might be overrepresented among driver fatalities.

Method

A population level case-control analysis was conducted using data on drivers that died in crashes in road crashes British Columbia during the years 2006 through 2010 (cases) and data from roadside surveys conducted in British Columbia in 2008, 2010, and 2012 (controls).

Data on fatally injured drivers in British Columbia were extracted from the national fatality database, which includes the results of toxicological tests for drugs and alcohol. A total of 902 fatally injured drivers of highway vehicles, 16 years of age and over, who died within 6 hours of crash involvement and were tested for both alcohol and drugs were included. These cases were divided into four groups according to drug and alcohol use: Alcohol and Drug Negative (n=339, 35.9%), Drugs only (n=188, 19.9%,), Alcohol only (n=187, 19.8%), and Alcohol and Drugs (n=188, 19.9%).

The roadside surveys were conducted by randomly selecting drivers from the traffic flow at pre-selected locations in four time periods (21:00-22:30; 22:30-00:00; 00:00-01:30; and 01:30-03:00) on Wednesday, Thursday, Friday, and Saturday nights in June 2008, 2010, and 2012. Drivers were asked to voluntarily provide a sample of breath and oral fluid for analysis of alcohol and drug content. Further details of the procedure can be found elsewhere (Beirness and Beasley 2010).

A total of 6,884 vehicles were randomly selected from the traffic flow for participation in the three roadside surveys. Among the vehicles selected, 88.2% of drivers provided a breath sample and 72.1% provided an oral fluid sample. There were 4,711 drivers that provided both an oral fluid sample and a breath sample. These drivers were divided into four groups according to drug and alcohol use: Alcohol and Drug Negative (n=3928, 83.4%), Drugs only (n=382, 8.1%,), Alcohol only (n=320, 6.8%), and Alcohol and Drugs (n=81, 1.7%).

Results

Table 1 presents the numbers of drivers in the case and control samples for various subgroups of alcohol and/or drug positive drivers along with odds ratios and 95% confidence intervals calculated using the alcohol- and drug-negative drivers as the comparison.

Table 1: Odds Ratios Comparing Alcohol and Drug Cases with Controls

	N Controls (Roadside)	N Cases (Fatalities)	Odds Ratio (95% Confidence Interval)
No Alcohol/Drugs (Comparison)	3928	339	1.0
Alcohol Only	320	187	6.77 (5.47-8.38)
Drugs Only	382	188	5.70 (4.63-7.02)
Alcohol+Drug	81	188	26.89 (20.2 – 35.7)
Alcohol <80 mg/dL	239	29	1.41 (0.94 – 2.10)
Alcohol >80 mg/dL	81	158	22.6 (16.9 – 30.2)
Cannabis	178	76	4.95 (3.70 – 6.62)
Cannabis + Alcohol	32	111	40.1 (26.7 – 60.4)
Alcohol Positive Male	224	148	7.66 (6.04 – 9.70)
Alcohol Positive Female	93	39	4.86 (3.29 – 7.18)
Alcohol Positive Age 16-24	75	47	7.26 (4.96 – 10.6)
25-40	135	64	5.49 (4.00 – 7.55)
41-55	73	47	7.46 (5.09 – 10.9)
56+	33	29	10.1 (6.11 – 16.98)
Drug Positive Male	291	135	5.38 (4.26 – 6.78)
Drug Positive Female	89	53	6.90 (4.83 – 9.87)
Drug PositiveAge 16-24	116	27	2.70 (1.75 – 4.16)
25-40	137	47	3.98 (2.8 – 5.64)
41-55	94	64	7.89 (5.64 – 11.04)
56+	32	50	18.1 (11.46 – 28.6)

The odds ratios indicate the odds of drivers who have used alcohol and/or drugs dying in a crash compared to the odds of a fatality occurring to drivers who have used neither alcohol nor drugs. Odds ratios that do not include the value 1.0 are deemed to be statistically significant.

As might be expected, drivers who had consumed alcohol were over 6 times more likely to die in a crash than drivers who had used neither drugs nor alcohol. Drivers with blood alcohol concentrations (BACs) of 80 mg/dL or less were 40% more likely than drivers free of alcohol or drugs to die in a crash but the increase was not statistically significant. The odds of drivers with BACs in excess of 80 mg/dL were 22 times higher than alcohol and drug free drivers to die in a crash.

Overall, driver drug use was associated with a 5.7 times greater likelihood of dying in a crash. Combining drugs with alcohol, and particularly alcohol in excess of 80 mg/dL, greatly increased the odds of drivers dying in a crash. The use of alcohol and drugs increased crash odds for both men and women and all age groups.

A separate analysis was conducted to specifically examine driver cannabis use. As shown in Table 1, cannabis use increased the odds of dying in a crash by a factor of close to 5. Using cannabis with alcohol increased the odds by 40 times.

Discussion

These results add to the body of evidence showing the increased risk associated with driving after using drugs, alcohol, and a combination of drugs and alcohol. The present study used two separate datasets in a population case-control analysis to assess the odds of drivers dying in a road crash following the use of alcohol and/or drugs. Alcohol and drug use were associated with a higher likelihood of fatal crash involvement. Combining alcohol and drug use further increased the odds of fatal crash. These relationships held for both males and females and all age groups. Isolating cannabis use among drivers in both populations also showed increased odds of fatal crash involvement, especially when combined with alcohol.

The approach used in this study is similar to that used by other researchers to assess the extent of risks posed by the use of alcohol and drugs by drivers (Dussault et al. 2002; Mayhew et al.). However, this approach is not definitive and has several limitations that must be considered in attempts to generalize the findings and use them to inform policy. The control population was a relatively large sample of drivers randomly selected from the traffic stream in selected cities in British Columbia during the month of June in 2008, 2010, and 2012. Although there were high rates of compliance with the request for breath and oral fluid samples to assess alcohol and drug use, respectively, there remains suspicion about the alcohol and drug use of those who refused. The municipalities selected for inclusion in the roadside survey included a large proportion of the population of drivers in British Columbia but were not deemed to be representative of the entire population. The roadside surveys were conducted in the month of June, which was deliberately selected to take advantage of generally favourable weather conditions and to avoid tourist seasons and holidays. The surveys were also restricted to Wednesday through Saturday nights between the hours of 2100 and 0300. This reflected the original survey plan that was designed to sample drivers at times known to be associated with drinking.

An effort was made to match the sample of fatally injured drivers to the roadside survey sample in terms of time of night, vehicle types, and years. Compromises had to be made to ensure sufficient cases for analysis. The fatality data for 2012 (and 2011) were not yet available so it was necessary to include data from 2006 and 2007 to provide a sufficiently long period to obtain an adequate sample of cases. Fatalities from all months of the year were also included. Cases were only included if they died within six hours of the crash and were tested for both alcohol and drugs. Over 86% of fatalities succumbed to their injuries with this period and 95% of these cases were tested for alcohol and 90% were tested for drugs. The 6-hour inclusion criterion may seem too long. Indeed, it is sufficiently long to allow lower alcohol and drug levels to fall below detectable thresholds. However, this criterion has been employed for many years and was preserved for this analysis. Any bias introduced by this criterion is conservative in that it would produce a lower number of cases found to be positive for alcohol and/or drugs.

Case-control studies of alcohol and drug use by drivers are logistically challenging to conduct and require a great deal of time and resources as well as considerable cooperation among road safety professionals, enforcement, and government officials. The present approach provides a means to begin to assess the risks associated with driving after using alcohol and drugs. Further studies with much larger sample sizes and a better match between cases and controls are required to provide the public and policy-makers with the best available information about the role of drugs in road safety. Demonstrating the increased risk of crash involvement associated with drug use, combined with information on the impairing effects of various types of drugs, provides enforcement, policy-makers and prevention specialists with the knowledge required to advocate for change and create programs and policies and procedures to help make the roads safer for all.

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