

## Medication Use by the Driving Population

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### SUMMARY

This study investigated patterns of medicine use among Spanish drivers. The study was conducted in the fall of 1993 on 1500 drivers aged over 16, all of whom completed accordingly and then returned the questionnaires. Among those surveyed, 45.1% had used drugs at least once in the previous year, while 17.3% of drivers surveyed were using medicines chronically. Chronic users, the majority of whom were female and belonging to the older age group, were using an average of two drugs. Central nervous system drugs (21.7%), respiratory system drugs (19.2%), cardiovascular system drugs (14.9%) and alimentary tract drugs (14.3%) were the most frequent groups of medication used. Of those surveyed 76.5% who took drugs regularly had never been warned by health professionals about the effects of the medication use on driving skills. The study shows both how often drivers use medication as well as the need to inform patients and drivers about the effect of medication on driving performance.

KEY WORDS — drugs; drugs and driving; traffic safety

### INTRODUCTION

Road traffic accidents have become an important health problem in developed countries and their prevention has long been a priority issue. Undoubtedly, alcohol consumption is one of the main causes of road traffic accidents. Nevertheless, it is often forgotten that other substances, such as certain forms of medication and illegal drugs, impair psychomotor skills related to driving.<sup>1</sup>

The relation between drugs, driving and road traffic accidents is a complex one. In laboratory experiments therapeutic doses of several drugs have been shown to impair psychomotor skills related to driving.<sup>2</sup> However, there are certain aspects which need clarifying. One is the relation between drug concentration and driving impairment; another, the legal consideration of drug levels similar to those of alcohol, etc.<sup>3</sup> In addition, information relating to the frequency of drug-use by drivers and the percentage of people who drive

while under the influence of psychopharmacological agents is scarce, and the figures available differ significantly. Perhaps this may be attributed to the diversity of exploratory methods used in the course of the studies undertaken; these include mailed questionnaires, prescription records, personal or telephone interviews, etc.<sup>4-9</sup> What is more, drugs have very often been found in body fluids among drivers involved in road traffic accidents.<sup>4-8</sup>

It has recently been estimated that at least 10% of all people killed or injured in road accidents were using some kind of psychotropic medication that could have been considered a contributory factor. This represents a direct cost each year to the European Community of at least 7 billion ECUs, 5000 deaths and 150,000 injuries.<sup>10</sup>

Under European Community Council Directive 91/439/EEC, authorities responsible for the issuing of driving licences must determine the applicant's lack of impairment due to their use of alcohol, illegal drugs and medicines,<sup>11</sup> although there exist difficulties concerning the implementation of this Directive.<sup>10</sup>

In most countries information about medication use and road safety is scarce and incomplete, and

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the present national study was carried out on a sample of Spanish drivers with a view to analysing the patterns of medication used by this section of the population, and how the use of medication could impair driving ability. Consideration has also been given to the information received by health professionals concerning the effect of medication on driving performance, thereby facilitating the proposal of measures as regards road safety. The study also analyses health status, illegal drugs<sup>12</sup> and alcohol consumption,<sup>13</sup> the results of which have been published elsewhere.

## METHODS

The questionnaire used included, among other items, sociodemographic data and patterns of medicine use and driving. Drivers were asked about the medicines they had used in the previous year and were using at present (when the survey was carried out). All the information pertaining to the medication (up to seven different drugs) was recorded: in each case they were asked about the registered name of the medicine they were using, the reasons for using it, the intake duration, and whether the medicine used was over-the-counter or medically prescribed. Each registered pharmaceutical preparation was coded following the Anatomical Therapeutic Chemical classification system.<sup>14</sup> Chronic drug use was assessed among those surveyed who, at the time of the study, were using medication. Chronic or regular use was defined as when the person concerned had been using the drug on a daily basis for at least 1 month. The *Summary of Product Characteristics*<sup>14</sup> for each medication was reviewed, and it was stated whether or not there was a warning about the effect of the medication on the ability to drive or use machinery. Those who drank at least once a week<sup>13</sup> were termed current alcohol drinkers.

The target population were those members holding a driving licence. A sample of 12,000 drivers was randomly selected (by age group and sex) from the National Official Register of Spanish Drivers. The sample size selection was based on response figure rates obtained from this register, and the aim was to obtain a final sample of at least 1500 individuals.

The questionnaire, with instructions for completion, were mailed to selected drivers between 26 September and 15 October 1993. By 15 December of that year, 1598 questionnaires were completed

and returned. All the questionnaires were checked for completeness and accuracy. Of these, 1500 were properly completed. Further questionnaires received (220 by mid-1994) were not considered for analysis. Of the mailed questionnaires, 2405 were sent back by mid-1994 because a wrong address was given.

The analysis of the data was carried out in the Data Processing Center at Valladolid University, using the statistical package SAS 6.07 version (under the VAX/VMS 5 version).

## RESULTS

The response rate (1720 out of 12,000: 14.3%) was as expected, and similar to that obtained earlier from this register (1116 out of 8200: 13.6%). However, we must recognize that this is a very low rate when compared with those obtained in other developed countries. The reasons for this could be: (i) the complexity of the questionnaire, dealing with information on matters as diverse as health status, use of medication, alcohol and illegal drugs. Therefore, completion of the questionnaire could be difficult for some people with a low education level. (ii) As it was clearly indicated in the questionnaire that the study was being carried out by the National Traffic Agency, many drivers could have been discouraged from answering the questionnaire. (iii) Possibly, yet most probably, the fact that in the official register of Spanish drivers a great number of addresses are incorrect, although every drivers should, according to law, give notification of any change in address. The said register is used for notification of sanctions and fines; a wrong address in the register prevents the driver from being notified, and prescription ensues if, after a certain length of time, the driver is not notified.<sup>12,13</sup>

This study is based on 1500 drivers who, as has already been stated, completed the questionnaire.<sup>12-13</sup> The sample distribution of respondents (by age group and sex) did not differ ( $p > 0.05$ ) from that of all Spanish drivers. Table 1 shows the gender distribution of the sample as regards their sociodemographic characteristics. The sample could not be compared with the entire driving population on additional variables because the official register of Spanish drivers has information regarding only age, sex, type of driving licence and address.

Of the Spanish drivers surveyed, 45.1% (676 out of 1500, Table 2) had used drugs at least once in the

Table 1—Sociodemographic characteristics of the driving population surveyed

	Male		Female	
	n	%	n	%
Total	1016	67.7	484	32.3
Age range				
16–20	88	8.6	51	10.5
21–30	271	26.7	213	44.0
31–40	261	25.7	119	24.6
41–50	180	17.7	73	15.1
51–60	133	13.1	26	5.4
61–70	70	6.9	1	0.2
>70	13	1.3	1	0.2
Marital status				
Single	363	35.7	259	53.5
Married	621	61.1	193	39.9
Divorcee	20	2.0	22	4.5
Widowed	12	1.2	10	0.1
Educational level				
No schooling	11	1.1	3	0.6
Primary	175	17.9	40	8.4
Middle	212	21.7	78	16.5
Secondary	264	27.0	150	31.6
High	115	11.8	83	17.5
University	200	20.5	120	25.3

pervious year (43.4% among males and 48.5% among females,  $p < 0.05$ ). As regards the number of medicines, most of them had used either one (58.0%) or two (28.8%). Three or more drugs were used by 13.2%.

Of drivers surveyed, 17.3% (259 out of 1500 surveyed, Table 2) were using medicines chronically (16.9% of males and 18.0% of females,  $p < 0.05$ ), and, the older the individual the more

common this phenomenon was. Of these, 39% were using one drug, 39% two drugs, and 22% were using three or more drugs. Each of these individuals ( $n = 259$ , 511 drugs, Table 2) was using an average of  $1.97 \pm 1.10$  (mean  $\pm$  SD) medicines ( $1.87 \pm 0.98$  for males —  $n = 172$ , 323 drugs — and  $2.16 \pm 1.29$  for females —  $n = 87$ , 188 drugs,  $p = 0.0506$ ).

The four most common chronically used groups of drugs (Table 3) were central nervous system drugs (21.7%), respiratory system drugs (19.2%), cardiovascular system drugs (14.9%) and drugs for the alimentary tract and metabolism (14.3%). Table 3 shows also the gender distribution regarding the medicines used.

For 26.4% (Table 3) of the medication used chronically (135 out of 511) there was a warning in the *Summary of Product Characteristics* about the effect of the medication on the ability to drive and the safe use of machinery. Most medications supplied with this warning are cardiovascular system drugs (29.6%), central nervous system drugs (31.1%) and respiratory system drugs (22.2%). This data shows that 4.6% of drivers (26.4% of the drugs taken chronically by 17.3% of the population) were using medication that impairs driving performance. Table 3 also shows registered drugs in Spain, as well as those with a warning concerning the effect of the medication on driving ability (503 out of 3720: 13.5%).

Among all those surveyed, 62.9% (943 out of 1500) were current alcohol drinkers,<sup>13</sup> and 64.5% (167 out of 259) were among those who took medicines regularly. Only 21.6% of those using medicines (56 out of 259) admitted not having consumed alcohol when using medicines. It was

Table 2—Patterns of medication use by Spanish drivers

	Sample distribution	Medication use in past year		Chronic use of medication	
	n	n	%	n	%
Total	1500	676	45.1	259	17.3
Sex		$\chi^2 = 3.5$	$p < 0.05$	$\chi^2 = 0.25$	$p < 0.05$
Male	1016	441	43.4	172	16.9
Female	484	235	48.5	87	18.0
Age range					
16–20	139	66	47.5	28	20.1
21–30	484	235	48.5	66	13.6
31–40	380	157	41.3	50	13.2
41–50	253	105	41.5	42	16.6
51–60	159	70	44.0	40	25.2
61–70	71	38	53.5	28	39.4
>70	14	5	35.7	5	35.7

Table 3 — Types of medication used by Spanish drivers, and warning about medication used and driving ability

Anatomical Therapeutic Chemical classification system	Past year		Total		Medication used				Warning*		Registered medication in Spain			
	n	%	n	%	Male	Female	Chronic use	n	%	Total	Warning*			
Alimentary tract and metabolism	125	11.4	73	14.3	55	18	17.0	18	9.6†	8	5.9	748	103	13.8
Blood and blood forming organs	27	2.5	27	5.3	7	20	2.2	20	10.6†	1	0.7	350	3	0.8
Cardiovascular system	76	6.9	76	14.9	63	13	19.5	13	6.9†	40	29.6	294	116	39.4
Dermatologicals	7	0.6	4	0.8	2	2	0.6	2	1.1	0	0.0	386	0	0.0
Genito-urinary system and sex hormones	22	2.0	19	3.7	6	13	1.9	13	6.9†	1	0.7	143	7	4.9
Systemic hormonal preparations, excluding sex hormones	8	0.7	5	1.0	3	2	0.9	2	1.1	0	0.0	52	1	1.9
General antiinfectives for systemic use	164	14.9	43	8.4	26	17	8.0	17	9.0	6	4.4	287	31	10.8
Antineoplastic and immunomodulating agents	0	0.0	0	0.0	0	0	0.0	0	0.0	0	0.0	57	0	0.0
Musculoskeletal system	59	5.4	34	6.6	19	15	5.9	15	8.0	7	5.2	159	18	11.3
Central nervous system	331	30.2	111	21.7	65	46	20.1	46	24.5	42	31.1	357	129	36.1
Antiparasitic products	0	0.0	0	0.0	0	0	0.0	0	0.0	0	0.0	13	1	7.7
Respiratory system	238	21.7	98	19.2	65	33	20.1	33	17.6	30	22.2	548	88	16.0
Sensory organs	10	0.9	6	1.2	6	0	1.9	0	0.0	0	0.0	212	4	1.9
Various	30	2.7	15	2.9	6	9	1.9	9	4.8	0	0.0	114	2	1.7
Total sample	1097	100.0	511	100.0	323	188	100.0	188	100.0	135	26.4	3720	503	13.5

\*There is a warning about the effect of the medication on the ability to drive or use machinery in the *Summary of Product Characteristics*.<sup>14</sup> Chi-square male compared to female: † $p < 0.05$ , ‡ $p < 0.005$ .

not common for those surveyed (5.8%,  $n = 15$ ; 4.6%,  $n = 8$  for males, and 8.0%,  $n = 7$  for females,  $\chi^2 = 1.22$ ,  $p < 0.05$ ) to report that the medication used regularly affected their driving performance.

Surveyed drivers who took drugs regularly were asked if they had been warned by health professionals about the effects of the medication used on driving skills: of these, 76.5% had never been warned, 19.4% had been warned on some occasions, and 4.1% had frequently been warned. Similar figures ( $\chi^2 = 0.24$ ,  $p < 0.05$ ) were found between sexes (never: 75.6% males and 78.5% females; some occasions: 20.1% males and 17.7% females; frequently: 4.3% males and 3.8% females).

## DISCUSSION

The present study shows a series of interesting data, the first of which is that medicines are frequently used by the population. Certain medications have been used by 45.1% during the last year and 17.3% use them chronically. It has to be pointed out that among regular users, the majority take an average of two medications. Another remarkable fact is the frequency of joint use of alcohol and medication. Finally, and what is more important, is that in three out of four cases concerning regular drug users, health professionals do not provide the patient with any information as regards the effect of the medication on driving ability.

A comparison with the data obtained in other studies is difficult, due to a lack of standardization and the different types of methodology used. For instance, a study among the Austrian population revealed that drug intake was reported by 44% in the 3 months prior to the interview, and 27% in the previous week; furthermore, the average number of drugs used was 1.84.<sup>5</sup> In a French study on victims of road traffic accidents, 23.6% admitted having taken medication 5 days before the accident.<sup>6</sup> In a Finnish study on casualties attending emergency departments, 31.6% said that they had used some medication a week earlier, whilst 15.3% admitted having used some medication a week prior to the accident.<sup>4</sup> In the United Kingdom, the frequency with which medicines are used among samples of the general driving population ranges from 5.5% to 22%; for those medications likely to have an effect on the central nervous system, the frequency is between 2% and 5%.<sup>8</sup>

The present study also shows that these people often use various types of medication at the same

time: 61% use two or more types of medication. This makes interactions more common and, consequently, causes a greater deterioration of psychomotor performance in certain cases. What is not surprising, given the fact that alcohol is usually consumed in many European countries, is that alcohol consumption among the drivers surveyed is frequent: 62.9% among all those surveyed and 64.5% among those who usually use medication; this confirms the previous findings.<sup>15</sup> A fact to be considered, is that consuming alcohol and using medication have negative effects on psychomotor performance, and, as a result, there is a greater accident risk. What is more, it is appropriate to mention that only a small number of those who normally use medication (5.8%) admit that that medication affects their driving performance.

Within the European community, package inserts include a statement regarding the effects of medication on the ability to drive or use machinery.<sup>11</sup> Furthermore, there has recently been accepted a three-tier warning system to identify the hazard potential of drugs on driving ability in the *Summary of Product Characteristics*.<sup>11</sup> There is a statement concerning medication effects on the ability to drive among 26.4% of chronically used types of medication (4.6% for all surveyed). This is important, and it is logical to think that these individuals might experience impairment of certain of the faculties needed for safe driving. However, although the data do not permit us to state whether these people were in the habit of driving under the influence of medication, they do demonstrate the frequency with which medication that could impair driving performance is used. Furthermore, among all registered medications in Spain, 13.5% contain a warning regarding their effect on driving ability.

Age and sex are among the major factors influencing the level of drug use:<sup>16</sup> elderly and female are the most common characteristics of drug users. In the present study, chronic use of medication is more common among the aged population, while no significant differences were found between sexes (although the figures for women were higher than those for men). The reason could be related to the fact that most female drivers in Spain belong to the younger age groups. In 1993 there were about 15,882,000 drivers in Spain, men (67.3%) are more than twice as likely than females (32.7%) to be drivers.

Finally, and more significantly, in 76.5% of cases, health professionals have never warned their patients about the effect of medication on driving

performance. This finding coincides with the data encountered in previous studies.<sup>17</sup> In spite of product information and labelling, we believe<sup>11</sup> that health professionals — doctors and chemists — should give advice to their patients about the extent to which the medication prescribed (as well as illness and alcohol consumption) might interfere with their driving ability.

The present study is not without several limitations (a low response rate, its descriptive nature, etc.), but it does highlight the large number of drivers using medication that could impair driving performance. Even so, we will admit that some possible variations in the gathered information could exist, because we cannot exclude over- or underreporting medication use. There is a need to standardize the methodology employed in this field,<sup>18</sup> in order to characterize the extent of this phenomenon. In the last few years, not only have legislative rules been introduced, but special attention has been devoted to assessing the risk of being involved in a traffic accident while driving after using medication. Several studies<sup>19–21</sup> have shown the increased risk of being involved in a road accident when driving under the influence of some medication, mainly psychotropic medication.

The full impact of medication on driving is difficult to establish, but it is easy to accept that some kinds of medication interfere with driving performance and, therefore, could increase the risk of road accidents.<sup>1</sup> Road accidents represent one of the main public health problems worldwide, and the need to develop policies geared towards their reduction is becoming more and more urgent. The role of medication as regards road safety should not be forgotten. Doctors should be aware of the possible influence of the medication prescribed on driving performance, and should inform their patients about it.

#### ACKNOWLEDGEMENTS

Support for this study was provided by the Dirección General de Tráfico, Ministerio de Justicia e Interior, Madrid (Spain).

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