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ALCOHOL AND CELL PHONE ASSOCIATED EFFECTS ON CAR DRIVERS TESTED IN AN EXPERIMENTAL ROADTEST

Abstract: The present study objectified the analysis of the physiological alterations in drivers who associate alcoholic beverages and mobile phone in the conduction of a vehicle. Practical tests in an experimental roadtest had been carried through, simulating common situations of transit, with four volunteers, who had lead a vehicle in different levels of alcoholemy and combined to the use of the mobile phone. After the accomplishment of the practical tests, it was perceived that with alcoholemy higher than 0,6g/L and the use of cell phone, 66% of the volunteers had not respected the landmark of the passage, 33% of them had wrongly understood the commands of the person who orientated and 100% of them had not correctly answered 80% of the tests of logical reasoning. It was concluded that there is not a parameter of safety of the usage of alcoholic beverages in the conduction of a vehicle, still observing the increase of the possibility of automobile accidents when associated to the use of cell phone.

Keywords: Driver under influence; alcohol; mobile phone; alcoholemy effects.

Introduction:

Traffic accidents kill more than a million of people per year globally and leave between 20 to 50 million wounded people¹. In Brazil, in the year of 2005, around 500 thousand traffic accidents with victims occurred, causing the death of 35 thousand people, the majority of them in the age group that similarly corresponds to the interval between 18 and 59 years, affecting drivers, passengers and pedestrians^{2,3,4}. In California / USA, 45% of the accidents with victims and 70% of deceased in traffic accidents presented significant alcoholemy⁵. With the purpose of reduction of the accidental events in result of the evidences of abuse of alcoholic beverages and traffic accidents, the new Brazilian Transit Code (2008) establishes that driving under the influence of any alcohol concentration per liter of blood subjects the conductor to the penalties foreseen for the law, being configured criminal penalty to drive under the influence of alcohol or any other psychoactive substance that determines dependence^{3,5,6,7}.

Another factor related to the increase of automobile accidents, even so considered medium infraction for the Brazilian Transit Code, is the use of mobile phone during driving^{8,9,10}. British studies demonstrated that the reaction to an unexpected situation of someone who

is speaking on the mobile phone is 30% slower than of a person who had drunk a little above the limit allowed for the British law and 50% slower than of a driver in normal conditions^{11,12,13}. The main damages caused for the association of the binomial cellular-driving constitute in the distraction, that occurs for the interaction between the conductor and his interlocutor, and in the commitment of a good technique of driving due to the withdrawal of one of the hands of the wheel for handling the device^{5,14,15,16}. It is deduced that still more powered effects could be gotten when associating the triad: alcohol, cellular and driving with incalculable catastrophic results and losses^{12,16,17,18}. Therefore, this paper is justified for the increase of automobile accidents involving drunk drivers and for the lack of studies in Brazil relating the use of alcoholic beverages and the use of cellular in the transit.

Materials and Methods

Practical tests had been carried through on September 14th of 2008, in an automotive vehicle in the city of Rio Acima (near the city of Belo Horizonte), State of Minas Gerais/Brazil. Common events of the transit in a track consisting in one tarred part and another one of land and gravel, duly interdicted had been simulated for competent authorities. The sample used in the experiments constituted from four volunteers, subdivided in two groups: Group A (two women) and Group B (two men).

| VOLUNTEERS AGE AND WEIGHT. | | | | |
|----------------------------|-------------|--------------|---------------|--------------|
| DATA | GROUP A | | GROUP B | |
| | Volunteer I | Volunteer II | Volunteer III | Volunteer IV |
| Age (years)..... | 21 | 23 | 32 | 27 |
| Weight (Kg)..... | 59 | 63 | 87 | 64 |

Table 1

As measures of security in the tests, a prepared car of driving school was used with auxiliary system of control of the vehicle, manned by a qualified instructor. An allowed maximum speed was established and an ambulance was available for medical attendance, in case it was necessary. One breathalyzer was used in order to indicate the breath sample to estimate the blood alcohol content – alcoholemy (Figure 1). The test was divided in two parts: non-chronometered (Figure 2) and chronometered (Figure 3). In the non-chronometered test, the time and the variations of speed of execution of the maneuvers were disregarded, being only analyzed the correct execution of the following maneuvers: reverse parking in garage, parallel parking (Figure 4) and clutch control on a hill (Figure 5). In the chronometered test, the possible variations of speed of the vehicle throughout the circuit had been evaluated, as well as the time of execution of the tests. The carried through maneuvers had been curves, eight-shapped curves (Figure 6), “slalons” (Figure 7), prevention accident test (Figure 8) and the braking test (Figure 9). The landmark of the circuit occurred with the use of continuous striped ribbons equidistant 3m and cones equidistant 5m. The adopted speed standard was from 15 to 20 Km/h throughout all the circuit, except in the test of prevention of accidents in which the speed standard corresponded to a principle of 40Km/h. Moreover, the number of knocked down cones were accounted.

The tests were carried through by the same driver in various situations, being that before the beginning of the first test each volunteer could make the recognition of

the circuit. In situation 1 (control), the driver made the passage without any alcohol concentration in the blood and without any factor that could deviate his attention. After that, the variables of the experiment that had consisted of increasing increase of the alcoholemy and questions of logical reasoning and/or answered mathematical tests to the cellular had been gradually added.

It is standed out that it had been maintenance of the hidden elements with the mathematical questions and of logical reasoning. Moreover, the orientations of conversion in the test of prevention of accidents and the lowering of the flag in the braking test were different for the same driver, however the same to all the volunteers. The situations (Figure 10) in which the driver was submitted were:

- Situation 1: alcoholemy 0 g/l and without mobile phone use.
- Situation 2: alcoholemy 0 g/l and with mobile phone use.
- Situation 3: alcoholemy under 0,6g/l and without mobile phone use.
- Situation 4: alcoholemy over 0,6g/l and without mobile phone use.
- Situation 5: alcoholemy over 0,6g/l with mobile phone use.

For practical reasons, it was used as standard alcoholic beverage a distilled one, vodka, which alcoholic concentration is 40°GL. The dosage that each conductor received was proportional with his weight.

Results

In the first situation of the non-chronometered test all the volunteers were approved. However, when adding gradually the variable of the experiment, it was perceived the increase of errors of maneuvers in relation to the controlled situation; in the second situation it had an increase of 3 times the number of errors; in the third situation, the volunteers were wrong about 2 times more than in the first situation; while in the fifth situation it has been observed 5 times more errors than in the controlled situation. The maneuver most missed was the clutch control, followed of the parallel parking. In relation to the chronometered test, in higher alcoholemy over 0,6g/l, it had 2 times more errors and, when added by the cellular, it had about 3 times more errors than the controlled situation. The maneuvers most missed had been the sequence of curves in the asphalt and the test of prevention of accidents.

As for the test of logical reasoning, in alcoholemy 0g/l the average of rightness was 25,75% and in higher alcoholemy than 0,6g/l the average was only 9.15%. Moreover, evaluating reflexive capacity of the drivers for the braking test, it was observed that 100% of the volunteers had increased the distance followed when the alcoholemy was below 0,6g/L (Situation 3). When only the use of the cellular device was present (Situation 2), it was observed that 50% of the volunteers had increased the distance followed. Evaluating the time of accomplishment of the chronometered test, it had an increase of the time in 75% of the tested situations (TABLE 2).

| CATEGORY OF EVALUATION | EVALUATED SITUATION | | | | |
|-------------------------------|---------------------|-------|-------|-------|-------|
| | I | II | III | IV | V |
| Time of completion (min)..... | 02:28 | 02:45 | 02:17 | 02:35 | 03:00 |
| Distance followed (m)..... | 10,36 | 11,90 | 13,91 | 18,98 | 08,40 |

Table 2. Time of the circuit and distance followed in the braking test, by evaluated situation

Discussion

It was verified that the increasing alcoholism and the use of cellular telephone caused damages of attention, reduction of the cognitive and reflexive capacity of all the evaluated volunteers, proven for the biggest number of knocked down cones, low performance in the logical reasoning tests and errors in the accomplishment of maneuvers of the passage. When these two variables were associated it was observed that in 100% of the evaluated cases it had been alteration of the good technique of driving, evidencing that alcoholic beverage, use of cellular telephone and direction were incompatible. In Situation 5, most of the errors of the non-chronometered test had occurred in the clutch control and parallel parking. In the chronometered test of this same situation, the sequence of curves and test of accident prevention were the most missed ones; it also occurred an increase of the time for accomplishment of the test. These errors could be explained by the alteration of motor coordination caused by the alcohol and the use of only one of the hands to do the maneuvers.

Conclusion

This pilot study indicate that there is no safe parameter of usage of alcoholic beverage in the transit, therefore the psycho-motor reactions are individual and distinct in the various levels of tested alcoholism. Moreover, the use of mobile phone is an important factor of distraction in the conduction of a vehicle, being dangerously potentialized when associated with alcoholic beverages. In 2009, a new study is being carried through with a higher number of volunteers and involved situations.

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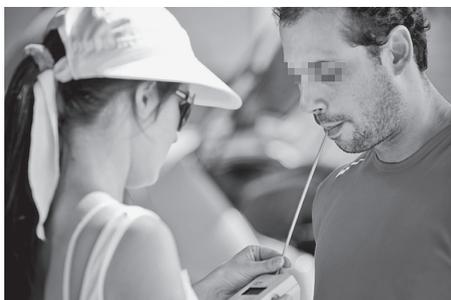


Figure – 1



Figure – 2

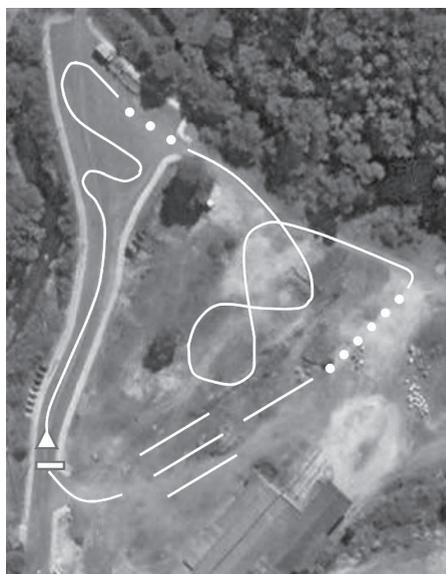


Figure – 3



Figure – 4



Figure – 5



Figure – 6



Figure – 7

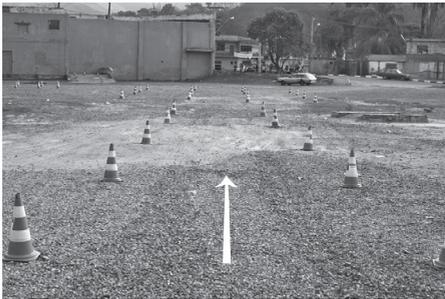


Figure – 8



Figure – 9

| | |
|-----------------------------------------------------------------------------------------|--|
| <p>First Situation: Alcoholometry 0 g/l without mobile phone use;</p> | |
| <p>Second Situation: Alcoholometry 0 g/l with mobile phone use;</p> | |
| <p>Third Situation: Alcoholometry <u>under</u> 0,6g/l without mobile phone use;</p> | |
| <p>Fourth Situation: Alcoholometry <u>over</u> 0,6g/l without mobile phone use;</p> | |
| <p>Fifth Situation: Alcoholometry <u>over</u> 0,6g/l with mobile phone use;</p> | |

Figure – 10