

**Traffic accidents and their relationship with serum levels of ethanol evaluated
in region La Libertad, 2014**

Accidentes de tránsito y su relación con niveles séricos evaluados de etanol de la región La Libertad, 2014

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The following study was cross-sectional and retrospective. The objective was to relate serum levels of ethanol with different types of traffic accidents that took place in La Libertad region in 2014; for this, blood samples of 981 people were processed. Car crash was found as the major type accident with an equivalence of 78, 28% of the total, and the minor was pedestrian accident with a 4, 20%. It was also observed that most of the drivers (72, 47 %) had an ethanol concentration of 0,5 – 1,5 g/l; which means they were drunk. This increases the probability of causing traffic collisions caused by drivers due to the fact that drunkenness lowers reflect and difficulties visual adaptation especially when it is dark. Then, drivers who were completely drunk are represented by a 16, 53 %, their concentration of ethanol was 1,5 – 2,5 g/l. These drivers are too aggressive and have difficulties when identifying colors, shapes, movements and dimensions. Finally, drivers in subclinical state (represented by the 11.00%), whose alcohol concentration in blood is around 0.1 to 0.5 g / l , might cause an accident because drivers misestimate speed and distance.

Key words: traffic accident, serum levels of ethanol**Resumen**

La presente investigación fue un estudio de tipo transversal y retrospectivo, teniendo como objetivo relacionar los niveles séricos de etanol, con los tipos de accidentes de tránsito, ocurridos en la región la Libertad durante el 2014, donde se procesaron 981 muestras de sangre correspondiente a igual número de individuos. Se encontró que el tipo de accidente de mayor porcentaje es 78.28% fue el choque, y el de menor porcentaje es 4.20 % de atropello. Se observa también que el mayor porcentaje de estos conductores (72.47 %) , su concentración es de 0.5 a 1.5 g /l, donde se encuentra comprendido estado de ebriedad, donde está muy aumentada la posibilidad de accidentes de tránsito ocasionados por los conductores, debido a la disminución de los reflejos y dificultad en la adaptación visual y en especial en la oscuridad. Luego sigue los conductores en estado ebriedad absoluta (16.53 %) cuya concentración en sangre 1.5 a 2.5 g /l. los conductores tienen mucha agresividad, y dificultad en percibir color, forma, movimientos y dimensiones. por último los porcentajes de conductores en estado subclínico (11.00 %), cuya concentración de alcohol es de 0.1 a 0.5 g /l en la sangre, tiene posibilidad de accidente porque los conductores tienen una falsa estimación de la velocidad y distancia.

Palabras clave: accidente de tránsito, niveles séricos de etanol**Received:** May 18, 2016.**Accepted:** June 08, 2016.**Published:** August 2016.

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Introduction

This research was motivated by the lack of studies related to traffic accidents, caused by intoxicated drivers. Nowadays, such accidents are caused by different circumstances, but driving while intoxicated is one of the major. These have caused already the death of many people.

In our society, alcoholic beverages can be sold without much restriction. It is acquired on authorized-selling establishments that have license for its sale. They are manufactured in different ways and have several colors and flavors. This product tastes good and its presence makes more pleasant any meeting. In western countries consumption is not prohibited, as happens for instance, in Islamic countries: the consumption is forbidden, and the transgression is severely punished.

Since long ago, moderate amounts of alcohol were known to have beneficial effects on appetite, as a result of its stimulating effect on the gastric secretion. Recently, benefits in cardiovascular diseases (red wine) have been shown. It is known that the man fermented sweet fruits, around 10000 years B.C, in Asia. Since then, its consumption has been increasing.

Alcohol is known to have various classifications. The most commonly used is the one related to the percentage of ethanol: rum, Peruvian pisco, vodka, tequila, whisky; as well as liquors, wines, etc. Not the consumption of alcoholic beverages but the abuse of them, has become a growing problem in our country; causing traffic accidents that take a heavy and increasing death toll.

The main figures of traffic accidents should be subjected to various experts evidence

procedures, in order to determine the causes of finding certain blood alcohol concentration during the blood alcohol test.

These accidents occur because of different factors: speeding, dangerous driving, geographical accidents, and driving under the influence of alcohol. Among the devices and methods used for the determination of blood alcohol concentration, there are qualitative methods, such as breath-alcohol detectors exhaled and chemical reactions; and quantitative methods as oxide-reduction, for instance, which employs biological blood samples.

To punish transgressors in any traffic accident where the guilty party has been under the influence of alcoholic beverages, the Legislative Power has put into operation legal standards that typify the crimes and offenses committed by people driving drunk.

As a matter of the legal limits of alcohol consumption compatible with road safety, it should be kept in mind that World Health Organization recommends setting as the rate of blood alcohol limit allowed for driving, 0.5 grams of alcohol per liter of blood. The blood alcohol concentration or concentration of alcohol in the body, is determined by the blood alcohol test. Its outcome constitutes an evidence of essential and determinant estimation for any legal effect, a fact that must be considered, not only by the insurance companies, police authority, users, and drivers; but also, by the judges who apply the law and consider the evidence.

It is important to clarify that the main component of alcoholic beverages is ethyl alcohol or ethanol, which can be found in all beverages produced by either formal or informal companies. They use strong and constant advertising campaigns and make its acquisition an easy process. Our society, with

its economic interests, customs, trends, and in some cases the scarce knowledge about negative effects of alcohol on drivers; do not question its consumption, but irresponsibility from people abusing in its consumption and driving under the effects of alcohol.

In Peru, the Congress of the Republic approved Law No. 29439 on November 19, 2009; that amends articles 124 and 274 of the Penal Code, which punishes people who drive a particular vehicle in a state of intoxication, provided that their intake of alcohol exceeds 0.5 gr./per blood liter and 0.25 g/per blood liter in case of driving of a vehicle that provides public transportation service as well as driving a vehicle under the influence of toxic drugs, narcotic drugs and psychotropic or synthetic substances.

The World Health Organization (WHO) predicts that deaths due to traffic accidents would increase by 80 % until the year 2020 in countries of low and middle income, as is the situation of our country with a middle income. According to WHO, alcohol is present in almost 35 percent of all deaths of drivers under the age of 20. This report aims to be a contribution to knowledge of serum levels of ethanol and its relationship with traffic accidents in La Libertad region in 2014.

Method

The research was a cross-sectional and retrospective study, it is determined the blood alcohol concentration of drivers of vehicles that caused traffic accidents and who were intervened by DIRSAN (Dirección de Sanidad- Health Department) 2014.

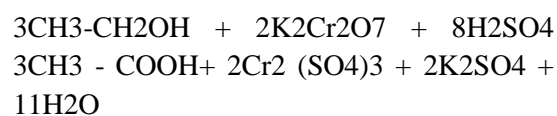
The research was carried out, taking the universal sample for 2014 in La Libertad region. There were 981 blood samples

processed, corresponding to an equal number of individuals.

The process was performed following the Sheftel method modified, better known as the differential colorimetry. It is based on the oxide-reduction of the sulfochromic mixture over the ethyl alcohol with formation of acetic acid and sulfate chromic, whose intensity of color varies from yellow to green in proportion to the concentration of ethyl alcohol present in the sample, which is measured in a spectrophotometer or photo-colorimetric, in 420 nm wavelength.

Two types of analysis were used to the research: qualitative and quantitative. In the qualitative analysis, it was used the calibration curve that related the absorbencies to concentrations, it is constructed by testing solutions of different concentrations and establishing for each of them its absorbance at a particular wavelength. In this part, it was taken into account the range that was found in practice within the limit of linearity, in order to comply with Beer law, and at the same time the interpolation of any result on the chart that would provide a reliable result.

In the quantitative analysis, it was used the differential colorimetry method, where the mixture of oxidant dichromate sulphuric acid acts on the ethyl alcohol turning it into acetic acid, to form chromatic sulfate with a coloration that varies from yellow to green, proportional to the concentration of alcohol in the sample, susceptible of being measured by photo-colorimetry, according to the chemical reaction.



Results

The data obtained were tabulated and processed with the program Microsoft Office Excel 2007.

The analysis of these data was performed taking as a basis the specific objectives of the researcher. There was constructed a one-entry table, and a double-entry with their absolute values and graphics were made to determine the relationship of serum levels of ethanol in drivers of vehicles with the type of traffic accident in La Libertad region during 2014. The non-parametric test of independence of criterion was used with the chi-square distribution with a credibility level of 5%.

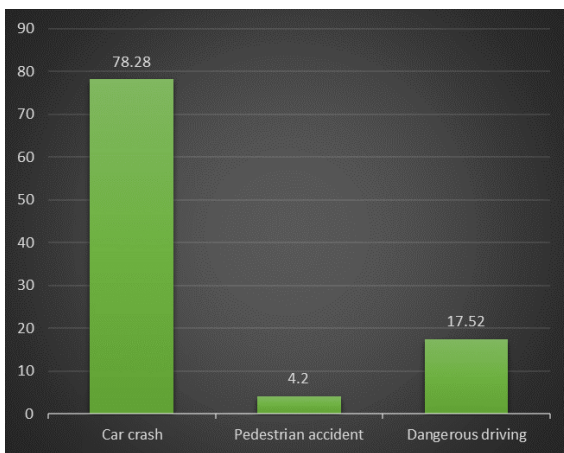


Figure 1. Results obtained from blood alcohol test taken by drivers of vehicles related to the type of accident caused, in 2014.

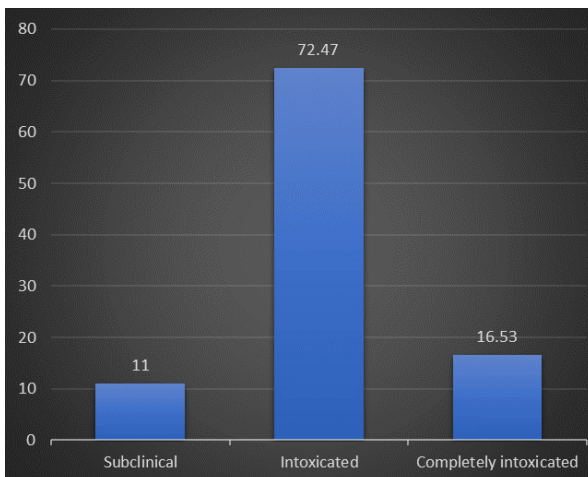


Figure 2. Results obtained in blood alcohol test for ethanol in 981 blood samples from an equal number of people that incur in traffic transgressions in La Libertad region, in 2014.

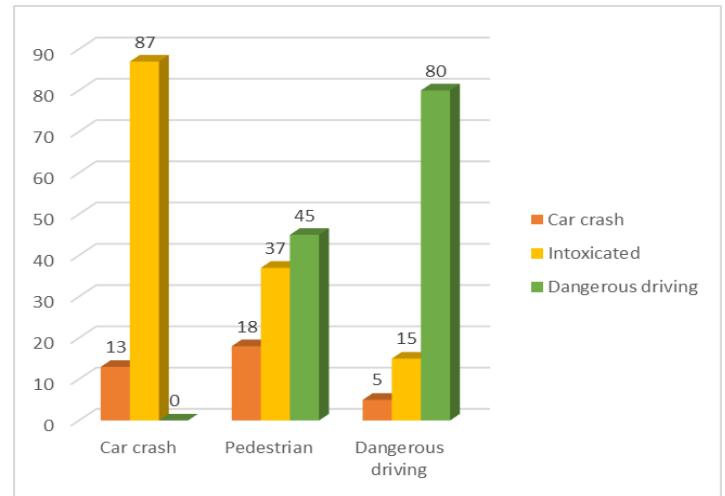


Figure 3. Relationship of type of traffic accident, its expression percentage and serum level of ethanol.

Table 1

Relationship of the type of traffic accident in their percentage expression with the serum level of ethanol tested.

Serum level of ethanol	Type of traffic accident						Total
	Car crash		Pedestrian accident		Dangerous driving		
	n	%	n	%	n	%	
Subclinical	9	12.	7	16.	8	5.8	10
Intoxicated	6	87.	1	38.	2	15.	71
Completely intoxicated	6	10	6	09	6	20	1
Completely intoxicated	6	0.8	1	45.	1	80.	16
			9	23	3	1	2
					7		
Total	7	10	4	100	1	10	98
	6	0	2		7	0	1
	8				1		

Discussion

It was demonstrated that results obtained in the blood alcohol test for ethanol in 981 blood samples from an equal number of people that incur traffic transgressions in The Libertad region, during 2014. Figure No. 1 shows that in 2014, 100 % (N = 981) of drivers of motor vehicles who have been involved in a traffic accident and have been taken a blood alcohol test for ethanol in REGSALL (Region de la Sanidad de La Libertad- Health Regional Direction in La Libertad). Car crash was found as the major type accident with an equivalence of 78, 28% of the total, in other words, it is the hit of a vehicle against a still obstacle in the nearby way, which can be even another vehicle, with the condition that is not in motion. The lowest percentage is 4.20 % and corresponds to pedestrian accident. These results match with the study of Cárdenas and Collazos of the Directorate of Statistics of the Major State of the National Police of Perú in 2010, and the Ministry of Health, with the work of epidemiological analysis of injuries caused by traffic accidents in Peru in 2013. That shows us that the largest number of traffic accident are car crashes, and that the run over represents a smaller percentage 18, 19. In Figure 2 it is observed that the highest percentage of these drivers (72.47%) were intoxicated. In this situation, the possibility of traffic accidents increases. Drivers have failing reflexions and difficulty in visual adaptation and specially when dark. They also become euphoric, talkative and not controlling what they say and without keeping limits that allow interaction with others. Its concentration is 0.5 to 1.5 g /l, which is equivalent to around 665 ml - 1995 ml of beer, and for wine, it equals to 200 ml - 600 ml. Then, there are completely drunk drivers (16.53 %) whose blood concentration

is 1.5 to 2.5 g /l. los conductores tienen mucha agresividad, y dificultad en percibir color, forma, movimientos y dimensiones. Finally, the percentages of drivers in a subclinical state (11.00 %), whose concentration of alcohol is 0.1 to 0.5 g /l in the blood. Even in small dosage, the main consequences include sight, reducing peripheral vision. For normal drivers, it is possible to observe objects at almost 170°, essential skill when we are driving in city traffic and needing to see vehicles or people approaching from an intersection without turning the head. There is a possibility of an accident happening, because intoxicated drivers have a false estimation of speed and distance. The first glass of beer (200 ml) causes this effect to appear, as well as alcohol concentrations lower than 0.2 grams of alcohol per liter of blood. This agrees with the National Plan of National Health Strategies National of Traffic Accidents 2009 - 2012. (Plan nacional de la estrategia sanitaria nacional de accidentes de tránsito-ESNAT 2009-2012) Figure No. 3 examines the drivers of auto motor vehicles according to the type of traffic accident and serum levels of ethanol for total of 768 drivers who collided with another vehicle. It was found that 669 drivers (87.10 %) were in a state of intoxication and 0.80 % of the drivers were in a state of absolute intoxication; 19 (45.23 %) of a total of 42 drivers who caused a pedestrian accident, were in a state of absolute intoxication, compared to the 16 drivers (38.09 %) who just were intoxicated. Finally, from 171 drivers who drove carelessly, 137 were in a state of absolute intoxication, equivalent to a percentage of 80.1 %, showing a higher percentage than 26 drivers who just were intoxicated (15.20 %). This coincides with the study of Malaga MEASURES AND STRATEGIES for the prevention and control of accidents.

Conclusions

It is concluded that drivers of motor vehicles who have a greater blood alcohol concentration, are in a state of intoxication, the 72.41 % of them are in this situation; by the other hand, those who were in a sub-clinical state had the lowest percentage (11%). When evaluating accidents data, the major type (78.29 %) was car crash and the minor (4.26 %), was pedestrian accident. The present study confirms that serum levels of ethanol are related to the type of traffic accident.

The effect is presented with the first beer glass (200 ml) and with alcohol concentrations lower than 0.2 grams of alcohol per liter of blood. Coincides with the work, the national plan study of the national sanitary strategy of traffic accidents 2009-2012.

Respect to figure 3. It analyzes their drivers of automotive vehicles according the type of traffic accident and serum levels of ethanol, 768 drivers who collided with another vehicle. It was found that 669 drivers were in drunkenness state with a percentage of 87.10% that of drunkenness absolute has a percentage of 0.80%.

42 drivers who ran over, 19 were in absolute drunkenness state that gave a percentage of 45.23% compared with 16 drivers who had drunkenness with a percentage of 38.09%

Finally, 171 drivers who had mislead, 137 were with absolute drunkenness that is equivalent to 80.1%, that has a higher percentage with 26 drivers in drunkenness states with 15.20%.

This coincides with the study carried out Málaga MEASURES AND STRATEGIES for the prevention and accidents control.

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