Determination of breath alcohol value after using mouthwashes containing ethanol

Mouthwashes are devices frequently used and suggested by dentist. Some mouthwashes contain ethanol (MCE), in order to improve their antibacterial activity. In Italian legislation there are a series of judgments reporting cases of drivers who resulted positive to the breath alcohol examination with the use of a MCE before the test. Breathalyzer test is a practice performed to detect alcohol-impaired-drivers that can be penalized if resulting positive. Sometimes, italian judges revoke the penalty justifying their decision with the fact that the presence of residual ethanol in the oral cavity can cause false positive values.

The aim of our study was to verify whether MCE are able to affect the values of breath alcohol concentration (BrAC) when subjects are tested with a breathalyzer. We determined zeroing time of these values and if subjects' body mass index (BMI) or gender influenced it. The value of BrAC showed by the breathalyzer has to be considered as a representation of the concentration of alcohol in our blood (BAC) due to an established ratio between these two values applied by the breathalyzer: BAC/BrAC usually ranges between 2000 to 2300, depending on different countries. In order to verify if the ethanol contained in mouthwashes was able to affect the blood value, we evaluated BAC by collecting blood samples after using MCE in a panel of healthy young adults.

Our study involved 40 volunteers; the cohort was composed of University students aged between 21 and 30 years. They underwent a medical examination to evaluate BMI and their general health. We selected four alcoholic mouthwashes available on the market with a different ethanol amount and an ethanol/water (10/90) mixture as a reference. BrAC values were collected using a portable breathalyzer immediately after the rinse, after 10 and 20 minutes. BAC was evaluated 5 minutes after the rinse.

Breathalyzer tests conducted immediately after the rinse showed us values higher than 0.5 g/L (Italian BrAC driving limit) in most of the subjects. However, all the values collected 10 minutes after the rinse are lower than this limit. Analyzing the possible correlation of the BrAC and both BMI and gender, we found out that there are no differences related to the physical characteristics of the subjects.

In conclusion, the high values determined immediately after the rinse are only influenced by residual ethanol in the oral cavity due to MCE rinse, and this explain the zeroing time of these values that is very swift. Even if MCE could alter the outcome of a single breathalyzer test, a simple protocol base on two samples performed at more than 5 minutes in between, could neutralize this drawback.

Alcohol related crashes are a top safety problem in several countries. Roadside breath alcohol testing is one of the most powerful deterrent available for police enforcement. MCE are frequently

used by a lot of people and in some cases are used as a justification to evade the traffic code.

The results we obtained in our work indicate that the use of MCE containing significant amounts of alcohol cannot justify the positivity of the alcohol measuring test and cannot be used as a tool for legal appeal.

Publication

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