The Reasons for Blood Ethanol Concentration Analyses in Patients Admitted to Emergency Department

Kübranur Ünal1, Turan Turhan2, Gökçe Atikeler1, Esin Çağrı2, Müge Şenmez2, Fatma Meriç Yılmaz4
1Department of Biochemistry, Polatlı Duatepe Public Hospital, 2Department of Biochemistry, Ankara Numune Training and Research Hospital, 3Department of Emergency, Ankara Numune Training and Research Hospital, 4Department of Biochemistry, Yıldırım Beyazıt University, Ankara, Turkey

Blood Ethanol Concentration in Emergency Department

Özet
Amaç: Bu çalışmanın amacı Türkiye’de alkohol tüketimi konusunda güvenilir veriler elde etmek, acil servise başvuran hastalarda kan etanol konsantrasyonu ölçüm nedenlerini değerlendirerek ve kan etanol konsantrasyonunun yaş, cinsiyet ve numune alma zamanı ile ilişkisini değerlendirmektir. Gereç ve Yöntem: Kan etanol konsantrasyonu ölçümü için acil servise gönderilen 801 hasta çalışmaya dahil edildi. Kan etanol konsantrasyonu >10 mg/dl olan vakalar etanol pozitif olarak kabul edildi ve kan sonuçlarına göre 3 grubu oluşturdu (<10 mg/dl, 10-50 mg/dl ve >50 mg/dl). Hastalar yaşlarına göre 3 gruba ayrıldı (<18, 18-40 ve >40 yaş). Olgular tanıları açısından; darp, motorlu araç kazası, yaralanma, intihar ve iş kazası olmak üzere sınıflandırıldı. Ayrıca hastalar numune alma zamanına göre de gruplandırıldı. Bulgular: Motorlu araç kazaları etanol analizi için acil başvuruların en sık sebebi olmuştu, çünkü bireylerin herhangi bir trafik kazasında dahil olması durumunda kan etanol konsantrasyonu ölçümü zorunludur. Diğer yandan etanol pozitif vakalar en sık bu sebebe sebep olmuş ve etanol tüketiminin saldırganlığına eğilim artırmıştır. Anahtar Kelimeler
Kan Etanol Konsantrasyonu; Acil Servis; Darp; Motorlu Arac Kazası

Abstract
Aim: The aim of this study was to obtain reliable data about alcohol consumption in Turkey, to evaluate the reasons for blood ethanol concentration (BEC) analyses in patients admitted to emergency departments, and to evaluate the relationship of BEC with age and time of sampling. Material and Method: A total of 801 patients who were admitted for analyses of BEC was included in the study. The results were classified into three groups according to BEC (<10 mg/dl, 10-50 mg/dl, and >50 mg/dl). BEC levels exceeding 10 mg/dl were accepted as ethanol positive (EthPos). The patients were categorized as three groups according to age (<18, 18-40, and >40). The cases were classified according to diagnoses: assault, motor vehicle crashes (MVC), injury, suicide, or occupational accident. In addition the patients were grouped according to their time of sampling, daytime or nighttime. Results: MVC was the most common reason for emergency admissions, while as- sault was the main cause in EthPos cases. BEC was <10 mg/dl in 72% of emergency admissions. Although BEC levels were in most cases <10 mg/dl at nighttime and daytime, levels >100 mg/dl were seen more frequently at night. Assault was the most common cause at night while MVC was most common during the day. EthPos cases were most often found in ages between 18- 40. Discussion: MVC constitutes the largest portion of all BEC tests among emergency admissions, while assault was the most common cause in EthPos cases. BEC was <10 mg/dl in 72% of emergency admissions. Although BEC levels were in most cases <10 mg/dl at nighttime and daytime, levels >100 mg/dl were seen more frequently at night. Assault was the most common cause at night while MVC was most common during the day. EthPos cases were most often found in ages between 18- 40. Discussion: MVC constitutes the largest portion of all BEC tests among emergency admissions, because individuals involved in any traffic accident are required to be tested for BEC. But assaults are the main causes in EthPos emergency admissions, as it is known that ethanol consumption increases tendencies toward offensive behaviors. Keywords
Blood Ethanol Concentration; Emergency Department; Assault; Motor Vehicle Crashes
Introduction
Ethanol is the most widely used addictive substance and the incidence of emergency department (ED) admissions due to ethanol intake is gradually increasing all over the world [1]. Additionally, frequent alcohol consumption is a sociomedical problem that affects a significant portion of the population, with >50% of the adult population of the United States (US) reported to be ethanol users. 26% of drug-related ED visits in the US involve ethanol combined with different drugs [2], and alcohol intoxication accounts for 3.6% of deaths worldwide [3]. Alcohol is a Central Nervous System (CNS) depressant with effects proportional to the ethanol concentration in the blood. Deterioration in driving skills that result from alcohol’s CNS depressant effects has been demonstrated at blood ethanol concentrations of as low as ≤50 mg/dL, with progressive impairment at levels >50 mg/dL. Effects on reaction time, visual tracking, mental concentration, attention time, information processing, perception, and psychomotor functions may result from alcohol-related driving impairment [4]. Ethanol reaches peak blood concentrations approximately 60 minutes after ingestion. The ethanol concentration decreases at a rate of approximately 20 mg/dL per hour [5,6]. Ethanol intake increases tendency to accidents (especially motor vehicle crashes—MVC), assault, injury, and suicidal attempts [7]. Our study aimed to obtain reliable and comparable data about alcohol consumption in Turkey, to evaluate the reasons for blood ethanol concentration (BEC) analyses in patients admitted to the ED, and to evaluate the relationships of BEC with age, sex, and time of sampling.

Material and Method
The records of 801 patients who were admitted to Ankara Numune Training and Research Hospital Emergency Biochemistry Laboratory for analyses of BEC between January and June 2014 were retrospectively reviewed. The patients were grouped according to BEC, diagnoses, age, gender, and time of sampling. Data were analyzed as percentages according to each criteria. BEC levels exceeding 10 mg/dL were accepted as ethanol positive (EthPos). The results were classified as three groups according to BEC (<10 mg/dL, 10-50 mg/dL, and >50 mg/dL). The patients were categorized as three groups according to age (<18, 18-40, and >40). The cases were classified according to diagnoses as assault, MVC, injury, suicide occupational accident (OA), and unknown. In addition the patients were grouped according to their emergency sampling time as daytime (08:00-19:59) and nighttime (20:00-07:59). Venous blood samples of patients were taken to gel containing tubes and centrifuged at 4000 rpm for 10 minutes to analyze the separated serum. Hemolyzed and icteric serum samples were excluded from the study. BEC results were given in two different units: mg/dL and g/L (mg/dL/100= Promil). In this study, BEC was also measured with the enzymatic method using the Roche P800 autoanalyzer (Roche Diagnostics, Mannheim, Germany) using original commercial kits. Statistical analyses was performed using SPSS 18.0 (SPSS Inc, Chicago, Ill.). Pie charts and bar charts were used to depict distributions. This study was approved by the ethical committee from the research office of Ankara Numune Training and Research Hospital (764 No 12.02.2014).

Results
232 of the 801 patients were EthPos. The number of male cases (87.5%) was significantly higher than female cases (12.5%) (Table 1). In 72.03% of the admissions, ethanol concentrations were <10 mg/dL, while they were >50 mg/dL in 26.09% of the admissions. The distribution of ethanol concentration in all cases is shown in Figure 1. MVC constitutes the largest portion of all BEC tests among emergency admissions. On the other hand, in the overall picture, assault is the main cause of EthPos emergency admissions (Table 2). In terms of overall ethanol concentration, nighttime (20:00-07:59) cases were significantly higher than the daytime (08:00-19:59) cases. Although BEC were in most cases <10 mg/dL at night and daytime, levels >50 mg/dL were seen more often at night. The distribution of ethanol concentration of all cases by daytime or nighttime admission time are shown in Figure 2.

Most of the EthPos cases were found between the ages of 18-39. Ethanol positivity was not observed in the <18 age group (Figure 3).

Discussion
Ethanol is the most frequently encountered toxic substance in both clinical and forensic analytical settings. Ethanol analysis is often requested to evaluate neurological status in life-threaten-
consumed alcohol before the offense in USA [14]. Ethanol intake seems to be a social problem in addition to its known effect on traffic accidents. In the overall picture, assaults are the main causes of EthPos emergency admissions, as it is known that ethanol consumption increases the tendency toward offensive behaviors [15]. In this study, MVC constituted the largest portion of all BEC tests among emergency admissions because individuals involved in any traffic accident are required to be tested for BEC, as these are considered to be judicial cases. Gentilello et al. showed that nearly half of all trauma beds are occupied by patients who were injured while under the influence of alcohol. Alcoholism plays a significant role and should be treated in trauma cases to reduce injury recurrence [16].

Demographics of the patients admitted to our emergency service were similar to the findings of other studies reported from Turkey. Prevalence data will help traffic safety professionals to adequately allocate resources and plan future efforts in reducing drinking-and-driving behavior, thereby reducing traffic accidents [17].

Standardized screening, brief intervention, and referral to treatment (SBIRT) intervention can decrease alcohol consumption, reduce injury, and decrease the number of emergency department visits [18]. However, it is not clear that SBIRT is an effective approach for dangerous alcohol use among patients in care [19]. Additional research, implementation, and interventions are needed to decrease alcohol consumption and admittance to emergency departments.

Finally, in this study, MVC constitutes the largest portion of all BEC tests among emergency admissions because individuals involved in any traffic accident are required to be tested for BEC, as these are considered judicial cases. On the other hand, in the overall picture, assaults are the main causes for EthPos emergency admissions, as it is known that ethanol consumption increases tendencies toward offensive behaviors.

**Competing interests**

The authors declare that they have no competing interests.

**References**

2. Aldworth J. Results from the 2007 national survey on drug use and health: National findings. DIANE Publishing; 2009.
12. Abuse S. Results from the 2010 National Survey on Drug Use and Health: MentalHealth Findings; 2012.
13. Murdoch D, Ross D. Alcohol and crimes of violence: Present issues. Interna-

How to cite this article: