



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

Acil Servise Başvuran Hastalarda Kan Etanol Konsantrasyonu Ölçüm Nedenleri

Blood Ethanol Concentration in Emergency Department

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Özet

Amaç: Bu çalışmanın amacı Türkiye'de alkol tüketimi konusunda güvenilir veriler elde etmek, acil servise başvuran hastalarda kan etanol konsantrasyonunu ölçüm nedenlerini değerlendirmek 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 grup oluşturuldu (<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. Buna ek olarak hastalar numune alma zamanına göre de gruplandırıldı. **Bulgular:** Motorlu araç kazaları etanol analizi için acil başvuruların en sık sebebi olmasına rağmen etanol pozitif vakalarda en sık başvuru sebebi darptı. Başvuruların %72'sinde kan etanol konsantrasyonu <10 mg/dL idi. Kan etanol konsantrasyonu >100 mg/dL olan başvurular daha çok geceydi. Darp gece, motorlu araç kazaları ise gündüz başvurularının en sık sebebiydi. Etanol pozitif vakalar çoğunlukla 18-40 yaş arasında idi. **Tartışma:** Motorlu araç kazaları kan etanol konsantrasyonu ölçümü için acile başvuruların ana kısmını oluşturmaktadır, çünkü bireylerin herhangi bir trafik kazasında dahil olması durumunda kan etanol konsantrasyonu ölçümü zorunludur. Diğer yandan etanol pozitif vakalarda en sık başvuru sebebinin darp olması etanol tüketiminin saldırganlığa eğilim artırmısıyla açıklanabilir.

Anahtar Kelimeler

Kan Etanol Konsantrasyonu; Acil Servis; Darp; Motorlu Araç 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 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

Blod Ethanol Concentration; Emergency Department; Assault; Motor Vehicle Crashes

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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

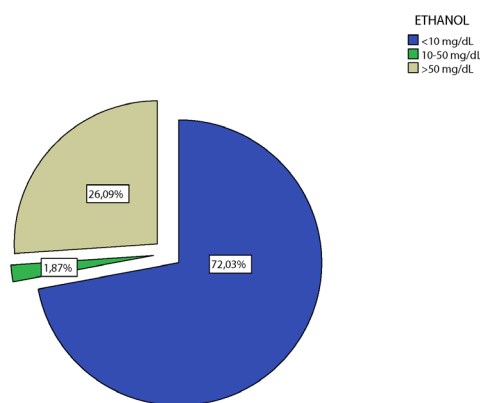
232 of the 801 patients were EthPos. The number of male cases (87.5%) was significantly higher than female cases (12.5%) (Table 1). In 72.03% of the admissions, ethanol concentrations

Table 1. Number of ethanol positive and negative cases according to sex

Sex		EthPos		EthNeg		Total	
		n	%	n	%	n	%
Female		29	12.5	105	18.4	134	16.8
	Male	203	87.5	464	81.6	667	83.2
Total		232	100	569	100	801	100

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

Figure 1. Distribution of ethanol concentration in all cases



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

Table 2. Ethanol Positiveness according to case

	Assault (n,%)	MVC (n,%)	Injury (n,%)	Unknown (n,%)	Suicide (n,%)	OA (n,%)	Total (n,%)
EthPos	93	60	31	19	6	0	209
	%44.5	%28.7	%14.8	%9.1	%2.9	%0	%100
EthNeg	202	262	79	19	6	24	592
	%34.1	%44.3	%13.3	%3.2	%1	%4.1	%100

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-

Figure 2. Ethanol concentrations according to application/admission time to the emergency

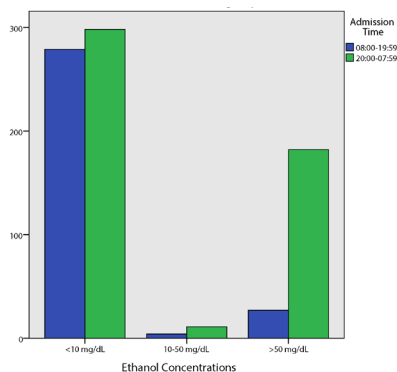
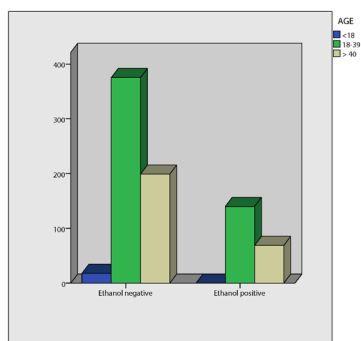


Figure 3. Frequency of ethanol positive and negative cases according to age



ing conditions, to monitor patients undergoing ethanol therapy due to methanol or ethanol toxicity, to monitor those patients enrolled in ethanol and other drug treatment programs, and to evaluate suitability of patients for organ transplantation [8]. Ethanol-related morbidity and mortality result principally from trauma. Traumas often associated with ethanol use include MCV, assault, injury, OA, criminal violence, and suicide. In our study MVC constitutes the largest portion of all BEC tests among emergency admissions.

BEC can be detected in body specimens such as urine and breath. The most commonly used alcohol analysis method in clinical settings is the enzymatic one. Enzymatic methods that are based on the oxidation of ethanol to acetaldehyde with concurrent reduction of nicotinamide adenine allow rapid, automated determination of ethanol in the laboratory setting [9]. Among people under the age of 35, traffic accidents are a leading cause of death. In 2009, 32% of mortal traffic accidents involved a driver or passenger with a BEC exceeding the legal limit [10,11]. The legal BEC limit is currently 50 mg/dL in Turkey for common motor vehicle drivers. The Law Prohibiting Teenagers from Drinking regulates minimum drinking age in Turkey, and people younger than 18 years are prohibited from purchasing and consuming alcohol. We observed BEC exceeding 50 mg/dL in 26.09% of patients.

In 2009, 18.7 million persons over 12 years of age were classified as alcohol abusers in the United States, which represents 7.4% of the related population [2]. Based on the data from another national survey, it can be stated that an estimated 12% of the population had driven under the influence of alcohol at least once during the previous year [12]. Ethanol abuse is common in homicide and domestic violence [13]. 24% of the 11.1 million violent crimes committed annually involve an attacker who had

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.

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