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AN EVALUATION OF CASES OF DROWNING PRESENTING TO THE KARADENIZ TECHNICAL UNIVERSITY MEDICAL FACULTY ADULT EMERGENCY DEPARTMENT

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ABSTRACT

Aim
To perform a descriptive study of presentations of drowning to the emergency department using demographic and clinical parameters.

Method
In this retrospective study, demographic and clinical data for cases presenting to the Karadeniz Technical University Medical Faculty Adult Emergency Department due to drowning in 2007-2017 were recorded from patients' records. Conclusions and statistical data are presented.

Results
Drowning was most common among males (74.5%), at age 30 or less (59.6%), in summer (76.6%) and in salt waters (85.1%). Eleven patients from the 47 cases died. In terms of mortality, no difference was determined between drowning in salt or fresh water, male and female gender, ability or inability to swim, age below or over 30 or between the seasons ($p > 0.05$).

Conclusion
The findings from this study show that drowning is most common among males, at age 30 or below, in the summer months and in salt water. The main reasons for the higher level of drownings in salt water may be that people in Trabzon prefer to swim in the sea, the lack of large expanses of agricultural land, water channels and ponds not generally being used for irrigation, swimming pools lacking popularity and not being widely available, and that due to its rather unusual natural character the Black Sea is relatively less well suited to swimming than other seas.

Key words: Emergency, drowning, demographics, salt water, fresh water, Black Sea

INTRODUCTION

Drowning, a leading and preventable cause of death in Turkey and worldwide, and was defined at the World Congress on Drowning held in Amsterdam in 2002 as 'respiratory impairment from submersion/immersion in liquid' [1].
According to the World Health Organization (WHO) global report on drowning, 388,000 die from drowning every year. Ninety-six percent of these deaths occur in undeveloped and developing countries [2]. The mortality rate from drowning in many African countries is 10-20 times higher than that in America [3].
Cases of drowning are commonly seen in settlement areas near the sea, lakes or rivers and with significant populations [4]. Mortality due to drowning affects all age groups, but is generally seen among young people, particularly below the age of 30. Death by drowning is more common in childhood and at young ages [5,6].
Drowning represents a significant health problem in Turkey, which is surrounded by seas on three sides and has numerous lakes, rivers and irrigation channels in many regions.
The purpose of this study was to identify the demographic characteristics of and factors affecting survival in adult cases of drowning, aged over 17, presenting to the Karadeniz Technical University Medical Faculty Adult Emergency Department in 2007-2017.

MATERIALS-METHODS

The study population in this descriptive research consisted of cases presenting to the Karadeniz Technical University Medical Faculty Adult Emergency Department due to drowning in 2007-2017. Data were recorded onto a data collection form via a retrospective scan of patients' medical files. Sociodemographic characteristics such as age, sex and place of residence (rural or urban) and information concerning time and date of presentation to the emergency department, place of drowning (sea, lake, pool etc.), salt/fresh water drowning, ability to swim and survival status following intervention in the emergency department were recorded on the form. Patients' ability to swim was determined based on information from families, and whether drownings occurred in fresh or salt water was determined based on the location involved. Drownings in the sea were classified as salt water and those in lakes, rivers or pools as fresh water cases.
Date analysis was performed on IBM SPSS Statistics for Windows 23.0 software. Descriptive data were expressed as number and percentage, and measurement data as mean, standard deviation and minimum-maximum values. The chi-square test was used to compare descriptive data. $p<0.05$ was regarded as statistically significant.

RESULTS

The mean age of the subjects was 30.9 ± 14.8 (16-79) years. Thirty-five (74.5%) were male and 12 (25.5%) were female. Eleven (23.4%) subjects presenting to the emergency department due to drowning subsequently died. Fifteen (31.9%) subjects lived in rural areas. Based on their own or relatives' statements, 27 (57.4%) were able to swim. Drownings were most common in the sea, at 85.1%, and least common, at levels of 2.1%, in rivers and lakes. In terms of times of presentation to the emergency department, the most common time frame was between 14.00 and 20.00. Presentations were least common between 08.00 and 14.00 (Table 1).

Table 1: Descriptive characteristics of cases

Sex	**No.**	**%**
Male	35	74.5
Female	12	25.5
Age		
30 or less	28	59.6
Over 39	19	40.4
Place of residence		
Urban	32	68.1
Rural	15	31.9
Swimming ability		
Yes	27	57.4
No	20	42.6
Site of drowning		
Sea	40	85.1
Pool	5	10.6
River	1	2.1
Lake	1	2.1
Season of drowning		
Summer	36	76.6
Spring	5	10.6
Fall	4	8.5
Winter	2	4.3
Time of presentation to the emergency department		
08:00 – 13:59	6	12.8
14:00 – 19:59	31	66.0
20:00 – 07:59	10	21.3
Survival status		
Survived	36	76.6
Died	11	23.4

When the parameters affecting subjects' survival status were examined, no statistically significant difference was determined in terms of mortality between the sexes, between subjects over and under 30 years, between subjects living in rural or urban areas or between subjects with or without the ability to swim. According to our study findings, drowning in salt or fresh water and seasonality also had no effect on mortality.

Table 2: Variables affecting subjects survival status

Independent variables	Surviving		Died		p
Sex	**No.**	**%**	**No.**	**%**	
Female	10	83.5	2	16.7	0.703
Male	26	74.3	9	25.7	
Age					0.159
30 or under	19	67.9	9	32.1	
Over 30	17	89.5	2	10.5	
Place of residence					0.725
Urban	25	78.1	7	21.9	
Rural	11	73.3	4	26.7	
Ability to swim					1.000
Yes	21	77.8	6	22.2	
No	15	75.0	5	25.0	
Place of drowning					0.659
Salt water	31	77.5	9	22.5	
Fresh water	5	71.4	2	28.6	
Season					1.000
Spring-Summer	31	75.6	10	24.4	
Fall-Winter	5	83.3	1	16.7	

DISCUSSION

Drowning is frequently seen among young males across the world. The reasons for this are a greater tendency to enter the water among males compared to females, their exhibiting more risky behavior in water and to their swimming alone or under the influence of alcohol. Similarly, studies in Turkey have also shown that cases of drowning are more common among males than females [7,8,9]. In agreement with the literature, 74.5% of the cases of drowning in this study occurred among males.

Söyüncü et al. investigated the 0-5, 15-25 and over 40 age groups and reported that the highest level of drownings, at 38%, occurred in the 15-25 age group [8]. While some similar studies have described age as a risk factor for drowning, others have reported that age did not affect their results [11,12]. Since the child cases of drowning in the Karadeniz Technical University Medical Faculty where this study was performed were evaluated at the pediatric emergency department, only cases of drowning aged over 17 presenting to the Karadeniz Technical University Medical Faculty adult emergency department were included in this study. Age distributions in drownings and identification of mortality by age levels may be important in terms of the adoption of measures to prevent drowning. The data were therefore subjected to statistical analysis from that perspective. Twenty-eight cases involved subjects aged 30 or under, and 19 subjects were aged over 30. No statistically significant difference was determined between the age groups ($p > 0.05$).

Studies investigating cases of drowning from various regions of Turkey have reported that such events are most common in the summer [13,14]. Another study performed outside Turkey and examining cases of drowning in the pediatric age group reported that 87% of drownings were seen

in the spring and summer [15]. Our study data show that cases of drowning were more common in the summer (76.6%).

Cantürk et al. reported that 86.5% of drownings occurred in fresh water in a study from the Central Anatolia region of Turkey, while Lakadamyalı et al. reported that 65.6% of drownings in a study from the Mediterranean region occurred in salt water [9]. In our study, it is noteworthy that 85.1% of drownings occurred in salt water. These variations between regions show the effect of geographical and marine characteristics on drownings.

A Canadian study determined that 48% of cases of drowning in the previous 20 years had occurred in the sea and 44% in pools [15]. Nichter et al. examined epidemiological data for cases of drowning over a 4-year period in the town of Pinellas in the US state of Florida. They reported that drownings were most common in the sea (47%), followed by swimming pools (22%), lakes (11%), baths (7%) and irrigation canals (6%) [16]. In these and similar studies performed in developed countries it is striking that cases of drowning in swimming pools are more common compared to in developing countries, such as Turkey. According to figures from the Forensic Medicine Group Office, 189 cases of drowning occurred in Şanlıurfa between 2001 and 2008, the majority in irrigation canals (67.7%), followed reservoir lakes (7.4%), water sumps (7.4%), pools (6.3%) and wells (5.3%) (17). In a study of cases of drowning from the province of Adana, Arslan et al. reported that drownings largely occurred in irrigation canals, at 61.45%, followed by rivers at 13.30% and reservoir lakes at 13.15% (7). The main reason for the difference between the sites of drownings in Şanlıurfa and Adana compared to the world in general is the large number of canals used for irrigation purposes in these cities. In our study, 40 (85.1%) of the 47 cases of drowning occurred in the sea, 5 (10.6%) in pools, 1 (2.1%) in lakes and 1 (2.1%) in rivers. The principal reason for this is that people in Trabzon prefer to swim in the sea. Reasons for this preference for the sea may include factors such as an absence of broad expanses of agricultural land, canals and ponds not being used for irrigation, and swimming pools not being popular or widely available. In addition, the rough and wavy nature of the Black Sea may also have contributed to the high number of drownings in the sea. Lakadamyalı et al. reported a 65.6% level of drownings in sea from the Mediterranean Sea, compared to 85.1% in our study. This may be due to the variety of fresh water areas in the Mediterranean region, the larger number of man-made structures such as irrigation canals and artificial ponds there due to the greater agricultural diversity, and other characteristic features of the Mediterranean region. The fact the Black Sea shore and sea are relatively less suited to swimming and that the Black Sea is rougher than the Mediterranean may also have affected the high level of salt water drownings in our study. All this information indicates that cases of drowning vary depending on geographical location. The development of drowning prevention programs in the light of data from Turkey and worldwide and the taking of measures aimed at the causes involved will reduce cases of drowning and drowning-related mortality.

Drownings are the fifth main cause of accidental deaths and the second most common in children under 15 [18]. Söyüncü et al. reported that four out of 34 cases of drowning presenting to the emergency department resulted in fatality [8]. In our study, approximately one case in 4 (23.4%) presenting to the emergency department due to drowning ended in death. This relatively high figure may derive from clinically severe cases of drowning being referred to our university hospital.

Since information about patients' ability to swim was generally obtained from answers given by relatives, our finding that this had no effect on survival may be misleading. Mortality levels can be reduced through the provision of swimming classes at an early age in Turkey, which is surrounded by seas on three sides and has a high variety of water sources, such as rivers. The fact that cases from the pediatric age group were not included is a limitation of this study.

There have been several studies concerning cases of drowning performed both in Turkey and in other countries. However, our scan of the literature revealed no previous studies of cases of drowning from either the province of Trabzon or the Black Sea region. From that perspective, this study is original in being the first to investigate cases of drowning in sociodemographic terms.

The findings from this study show that drownings are most common in males aged 30 or under, in the summer and in salt water. The mortality level is quite high since the data are from a university hospital only. The high level of drownings in salt water may derive from the nature of the Black Sea.

Nonetheless, this high figure for drownings in the sea suggests that there is still much work to be done in our region in terms of the teaching of swimming in the sea.

LIMITATIONS

This study was performed in the adult emergency department of a university hospital to which the most severe cases in the region are transferred. The cases referred were thus selected and may have been regarded as potentially fatal. The adult emergency clinical serves patients aged over 17, and the exclusion of younger patients may have affected the general average and statistical results. The data from this study performed in the university hospital of one geographical region may be expected to vary from those of studies from other geographical regions.

REFERENCES

1. Al-Fifi SH, Shabana MA, Zayed M, Al-Binali AM, Al-Shehri MA. Drowning in children: Aseer Central Hospital experience, Southwestern Saudi Arabia. Journal of Family and Community Medicine 2011;18(1):13-6
2. World Health Organization 2012, http://www.who.int/mediacentre/factsheets/fs347/en/
3. Bierens J. Handbook on Drowning: Prevention, Rescue, Treatment. Heidelberg: Springer 2012:102.
4. American Academy of Pediatrics Committee on Injury, Violence and poison Prevention. Prevention of drowning in infants, children and adolescents. Pediatrics 2003; 112: 437-9.
5. Shetty KS, Shetty M. Epidemiology of Drowning in Mangalore, a coastal Taluk of South India. J Forensic and Legal Med 2007; 14:410-5.
6. Murray C. J, Lopez A. D. Alternative projections of mortality and disability by cause 1990–2020: Global Burden of Disease Study. The Lancet 1997; 349(9064):1498-504.
7. Arslan M M, Çekin N, Hilal A, Kar H. Adana'da 1997-2006 yılları arasında meydana gelen suda boğulma olgularının incelenmesi. Türkiye Klinikler J Foren Med 2008; 5:13-18.
8. Söyüncü S, Işık S, Bektaş F, Yiğit Ö. Acil servise suda boğulma veya boğulayazma nedeniyle başvuran hastaların prognozunun belirlenmesinde GKS ve REMS skorlarının değerliliği. Turkish Journal of Emergency Medicine 2008; 8(2):67-72.
9. Lakadamyalı H, Doğan T. Türkiye'de Bir Turizm Yöresinde Suda Boğulma Olgularının İrdelenmesi. Turkiye Klinikleri Journal of Medical Sciences 2008; 28(2):143-8.
10. Anary S. H. S, Sheikhazadi A, Ghadyani M. H. Epidemiology of drowning in Mazandaran province, north of Iran. The American journal of forensic medicine and pathology 2010; 31(3):236-42.
11. Henderson H, Wilson R. C. Water incident related hospital activity across England between 1997/8 and 2003/4: a retrospective descriptive study. BMC public health 2006; 6(1):210.
12. Causey A. L, Tilelli J. A, Swanson M. E. Predicting discharge in uncomplicated near-drowning. The American journal of emergency medicine 2000; 18(1):9-11.
13. Arslan M, Kar H, Akçan R, Çekin N Suda boğulma tanısında kullanılan yöntemlerin irdelenmesi. Adli Tıp Bülteni. 2005; 1:29-34.
14. Cantürk N, Cantürk G, Karbeyaz K, Özdeş T, Dağalp R, Çelik, S Evaluation of the deaths due to drowning autopsied between 2003 and 2006 in Ankara. Türkiye Klinikleri J. Med. Sci 2009; 5:1198-205.
15. Somers G. R, Chiasson D. A, Smith C. R. Pediatric drowning: a 20-year review of autopsied cases: I. Demographic features. The American journal of forensic medicine and pathology 2005; 26(4):316-9.
16. Nichter M. A, Everett P. B. Profile of drowning victims in a coastal community. The Journal of the Florida Medical Association 1989; 76(2):253-6.
17. Benek S, Özcanlı M. Şanlıurfa İli'nde boğulma vakalarının incelenmesi (2001-2008). Marmara Coğrafya Dergisi 2015; (31):184-203.
18. Suominen P. K, Vähätalo R. Neurologic long term outcome after drowning in children. Scandinavian journal of trauma, resuscitation and emergency medicine 2012; 20(1):55.