

DEMOGRAPHICAL AND ETIOLOGICAL ANALYSIS OF POISONING CASES IN BURSA CITY; ARE THE CAUSES CHANGING ?

BURSA İLİ İÇERİSİNDE GÖRÜLEN ZEHİRLENME VAKALARININ DEMOGRAFİK VE ETYOLOJİK AÇIDAN DEĞERLENDİRİLMESİ; ETKEN FAKTÖRLER DEĞİŞİYOR MU?

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Cite this article as: Çıkrıklar Hİ, Durak VA, Aslan Ş, Sığırlı D, Armağan E. Demographical And Etiological Analysis Of Poisoning Cases In Bursa City; Are The Causes Changing ?. Med J SDU 2020; 27(4): 497-503.

Öz

Amaç

Zehirlenmeler dünya çapında önemli bir tıbbi, sosyal ve ekonomik problemdir. Gelişmiş ülkelerde intihar amaçlı ve kaza ile olan zehirlenmelerin yıllık insidansı %0.02-0.93 arasında değişmektedir ve dünyada her yıl artmaya devam etmektedir. Bu çalışmanın amacı intoksikasyon nedeniyle acil servislere başvuran hastaların demografik özellikleri, etyolojisi ve prognozunu incelemek; zehirlenme etkenlerinin yıllara göre değişimini araştırmaktır.

Gereç ve Yöntem

2010-2018 tarihleri arasında Bursa ilinde, akut zehirlenme nedeniyle acil servislere başvuran ve İl Sağlık Müdürlüğüne "18/C Zehirlenme Vaka Bildirim Formları" kullanılarak toplanan verilerin analizi yapıldı.

Bulgular

Çalışmada yer alan 28281 hastanın %56,31'i (n=15927) kadın, %43,69'u (n=12354) erkekti. En sık gözlenen zehirlenme nedeninin terapotik ilaçlara bağlı olduğu gözlenmiştir (n=11243, %39,75). İkinci sırada karbon monoksit (CO) zehirlenmesi (n=7043, %24,90) ve üçüncü sırada ise besin zehirlenmesi (n=4953, %17,51) yer almaktadır. Başvuru sıklığı yıllar içinde anlamlı değişim gösteren etkenler incelen-

diğinde terapötik ilaçlarla zehirlenme (p<0,001), ev kimyasallarıyla zehirlenme (p<0,001), bağımlılık yapan madde zehirlenmesi (p<0,001) ve hidrokarbonlu bileşiklere bağlı zehirlenme (p<0,001) oranlarındaki yıllara göre değişim incelendiğinde; diğer zehirlenme türlerine göre anlamlı artış görülmüştür. Karbon monoksit zehirlenmesi (p<0,001), besin zehirlenmesi (p<0,001), mantar zehirlenmesi (p<0,001) ve zehirli hayvan ısırma, sokma, vb. bağlı zehirlenme (p=0,003) oranlarındaki yıllara göre değişim incelendiğinde ise; diğer zehirlenme türlerine göre anlamlı azalış olduğu görülmüştür.

Sonuç

Karbonmonoksit, besin, mantar ve zehirli hayvan ısırmasına bağlı zehirlenme oranları azalırken; terapötik ilaçlar, ev kimyasalları, bağımlılık yapan madde, hidrokarbonlu bileşiklere bağlı zehirlenme oranları artmıştır.

Anahtar Kelimeler: Acil Servis, Zehirlenme, Toksikite

Abstract

Objectives

Cases of poisoning constitute a globally significant medical, social and economic problem. The annual incidence of poisoning cases in developed countries

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Müracaat tarihi/Application Date: 03.05.2019 • **Kabul tarihi/Accepted Date:** 21.08.2019

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with suicidal purposes or accidental intake varies in the range of 0.02-0.93%, and it continues to increase each year. The purpose of this study is to investigate the demographic characteristics, etiology and prognosis of patients who visit emergency department due to intoxication and examine the changes in the factors of intoxication based on years.

Materials and Methods

This study investigated data collected in the period of 2010-2018 in Bursa city by the Provincial Directorate of Health by using "18/C Intoxication Case Reporting Forms" on patients who visited the emergency departments due to acute toxicity.

Results

The most frequently encountered cause of poisoning was therapeutic medication (n=11243, 39.75%). Secondly carbon monoxide (CO) poisoning (n = 7043, 24.90%) and thirdly food poisoning (n = 4953, 17.51%) were found. Among the factors with significant changes in frequency through the years, it was seen that

poisoning by therapeutic drugs (p<0.001), poisoning by household chemicals (p<0.001), addictive substance poisoning (p<0.001) and poisoning related to hydrocarbon compounds (p<0.001) increased significantly in comparison to other types of poisoning. On the other hand, there were significant decreases in comparison to other types in poisoning cases related to carbon monoxide (CO) (p<0.001), food poisoning (p<0.001), mushroom poisoning (p<0.001) and being stung / bitten by poisonous/venomous animals (p=0.003).

Conclusions

While the rates of poisoning cases related to CO, food, mushrooms and poisonous/venomous animals decreased, the rates of poisoning cases related to therapeutic drugs, household chemicals, addictive substances and hydrocarbon compounds increased.

Keywords: Emergency department, Poisoning, Toxicity

Introduction

Cases of poisoning constitute a globally significant medical, social and economic problem(1). The annual incidence of poisoning cases in developed countries with suicidal purposes or accidental intake varies in the range of 0.02-0.93%, and it continues to increase each year (2). Epidemiological studies in our country revealed that 0.38-5.0% of all admissions to emergency departments consist of cases of poisoning (3-6).

Medication-relating poisonings usually occur as a result of attempted suicide by overdose in addition to their usage for treatment purposes (7, 8). With the explanation provided by Paracelsus for the first time as a definition "all substances may be poisonous, the thing that distinguishes a drug from poison is its dosage," it is understood that several substances may act like poison (9).

Early and appropriate intervention is the main issue in all cases of poisoning. It was shown that cases of poisoning have different patterns at different centers in different countries. The purpose of this study is to investigate the demographic characteristics, etiology and prognosis of patients who visit emergency departments due to intoxication and examine the changes in the factors of intoxication based on years.

Materials And Methods

This is a retrospective study and investigated data collected in the period of 2010-2018 in Bursa city by the Provincial Directorate of Health by using "18/C Intoxication Case Reporting Forms" on patients who visited the emergency departments due to acute toxicity. Data were obtained on the annual distributions of factors of poisoning, age intervals, sex and prognosis-related information. Chi-square trend test was performed to test the linear trend in the proportions. Significance level was taken as $\alpha=0.05$. IBM SPSS Statistics 23. 0 was used for statistical analysis.

Results

Among the 28281 patients included in the study, 56.31% (n=15927) were female, and 43.69% (n=12354) were male.

Table-1 shows the distribution of the total cases and cases with mortality based on causes of poisoning. Accordingly, the most frequently encountered cause of poisoning was therapeutic medication (n=11243, 39.75%). This was followed by carbon monoxide toxicity (n=7043, 24.90%) and food poisoning (n=4953, 17.51%).

Whether or not each type of poisoning changed based on years in comparison to other types was investi-

gated (Table-2). Among the factors with significant changes in frequency through the years, it was seen that poisoning by therapeutic drugs ($p < 0.001$), poisoning by household chemicals ($p < 0.001$), addictive substance poisoning ($p < 0.001$) and poisoning related to hydrocarbon compounds ($p < 0.001$) increased significantly in comparison to other types of poisoning. On the other hand, there were significant decreases in comparison to other types in poisoning cases related to carbon monoxide ($p < 0.001$), food poisoning ($p < 0.001$), mushroom poisoning ($p < 0.001$) and being stung / bitten by poisonous/venomous animals ($p = 0.003$) (Table-2).

Although there was a decreasing trend in the rates of poisoning related to addictive substances from 2016 to 2018, considering these in comparison to the reference year of 2010, there was an increase in general. In 2014, there were 202 cases of poisoning related to heavy metals. However, the analysis was repeated by extracting 202 outlier values that were obtained in 2014 due to an unnatural course of events. These events were not included in the study due to their unnatural status. Accordingly, after these values were removed, no significant change was found through

the years in the rates of poisoning cases related to heavy metals ($p = 0.055$).

Mortality was reported for a total of 100 cases among the 28281 cases of poisoning examined in the study. The mortality rates showed a trend of significant decrease throughout the years ($p < 0.001$) (Table-3, Figure-1).

Among all cases of poisoning, the mortality rate was 0.35% ($n = 100$). Among the total deaths, the most frequently encountered cases were carbon monoxide poisonings ($n = 80$, 80%), while all other deaths were caused by other types of poisoning ($n = 20$, 20%). Based on the comparisons of the mortality rates within the types of poisoning, the highest rate of mortality was found in cases of bottled gas poisoning ($n = 2$, 2.67%), followed by carbon monoxide poisoning ($n = 80$, 1.14%) (Table-1).

There were mortalities in 80 of the 7043 carbon monoxide poisoning cases in the study. The mortality rates related to carbon monoxide poisoning had a significant tendency to decrease through the years ($p = 0.002$) (Table-4, Figure-2).

Table 1 Frequencies of poisoning and mortality based on types of poisoning

Type of Poisoning	Total Cases n (%)	Deceased Cases n (% in total mortalities / % in total poisonings / % based on type of poisoning)
Therapeutic drugs	11243 (39.75)	6 (6.00 / 0.02 / 0.05)
Carbon monoxide poisoning	7043 (24.90)	80 (80.00 / 0.28 / 1.14)
Food poisoning	4953 (17.51)	2 (2.00 / 0.01 / 0.04)
Household chemicals	1853 (6.55)	1 (1.00 / 0.003 / 0.05)
Mushroom poisoning	870 (3.08)	0 (0.00 / 0.00 / 0.00)
Addictive substances	712 (2.52)	4 (4.00 / 0.01 / 0.56)
Hydrocarbon compounds	485 (1.71)	1 (1.00 / 0.003 / 0.21)
Pesticides and insecticides	434 (1.53)	3 (3.00 / 0.01 / 0.69)
Heavy metals	236 (0.83)	0 (0.00 / 0.00 / 0.00)
Alcohols	196 (0.69)	1 (1.00 / 0.59 / 0.51)
Poisonous / venomous animal bite / sting	134 (0.47)	0 (0.00 / 0.00 / 0.00)
Gas poisoning	75 (0.27)	2 (2.00 / 0.01 / 2.67)
Plants	44 (0.20)	0 (0.00 / 0.00 / 0.00)
Botulism	3 (0.01)	0 (0.00 / 0.00 / 0.00)
Total	28281 (100.0)	100 (100.00 / 0.35 / -)

Table 2 Comparison of poisoning rates for each type of poisoning based on years

Type of Poisoning		2010	2011	2012	2013	2014	2015	2016	2017	2018	p value
Therapeutic drugs	n (%)	1116 (29.28)	1358 (39.59)	1203 (33.75)	1329 (42.93)	1335 (38.66)	1408 (41.68)	1248 (43.03)	932 (46.39)	1314 (49.77)	<0.001
	OR	1.000	1.583	1.230	1.816	1.522	1.726	1.824	2.090	2.393	
Carbon monoxide	N (%)	1185 (31.09)	984 (28.69)	1116 (31.31)	834 (26.94)	747 (21.63)	723 (21.40)	561 (19.34)	385 (19.16)	508 (19.16)	<0.001
	OR	1.000	0.891	1.010	0.817	0.612	0.603	0.532	0.525	0.528	
Food	n (%)	1013 (26.58)	785 (22.89)	835 (23.43)	473 (15.28)	410 (11.87)	581 (17.20)	421 (14.52)	176 (8.76)	259 (9.81)	<0.001
	OR	1.000	0.820	0.845	0.498	0.372	0.574	0.469	0.265	0.300	
Household chemicals	n (%)	94 (2.47)	110 (3.21)	134 (3.76)	221 (7.14)	195 (5.65)	178 (5.27)	316 (10.90)	308 (15.33)	297 (11.25)	<0.001
	OR	1.000	1.310	1.545	3.040	2.367	2.200	4.836	7.160	5.012	
Mushrooms	n (%)	256 (6.72)	52 (1.52)	101 (2.83)	66 (2.13)	169 (4.89)	83 (2.46)	34 (1.17)	30 (1.49)	79 (2.99)	<0.001
	OR	1.000	0.214	0.405	0.302	0.715	0.350	0.165	0.211	0.428	
Addictive substances	n (%)	6 (0.16)	9 (0.26)	9 (0.25)	29 (0.94)	197 (5.71)	197 (5.83)	157 (5.41)	60 (2.99)	48 (1.82)	<0.001
	OR	1.000	1.668	1.605	5.996	38.369	39.274	36.298	19.523	11.744	
Poisonous/venomous animals	n (%)	35 (0.92)	11 (0.32)	20 (0.56)	9 (0.29)	30 (0.87)	13 (0.38)	9 (0.31)	4 (0.20)	3 (0.11)	<0.001
	OR	1.000	0.347	0.609	0.315	0.946	0.417	0.336	0.215	0.123	
Hydrocarbon compounds	n (%)	28 (0.73)	52 (1.52)	55 (1.54)	53 (1.71)	42 (1.22)	93 (2.75)	60 (2.07)	49 (2.44)	53 (2.01)	<0.001
	OR	1.000	2.080	2.118	2.353	1.664	3.825	2.854	3.378	2.768	
Pesticides and insecticides	n (%)	51 (1.34)	38 (1.11)	52 (1.46)	50 (1.61)	56 (1.62)	57 (1.69)	61 (2.10)	39 (1.94)	30 (1.14)	0.063
	OR	1.000	0.826	1.092	1.210	1.215	1.265	1.584	1.460	0.847	
Heavy metals	n (%)	5 (0.13)	7 (0.20)	5 (0.14)	2 (0.06)	202 (5.85)	2 (0.06)	3 (0.10)	4 (0.20)	6 (0.23)	0.055*
	OR	1.000	1.557	1.069	0.492	47.297	0.451	0.788	1.519	1.734	

*Calculated by extracting the data for 2014.
OR: Odds ratio

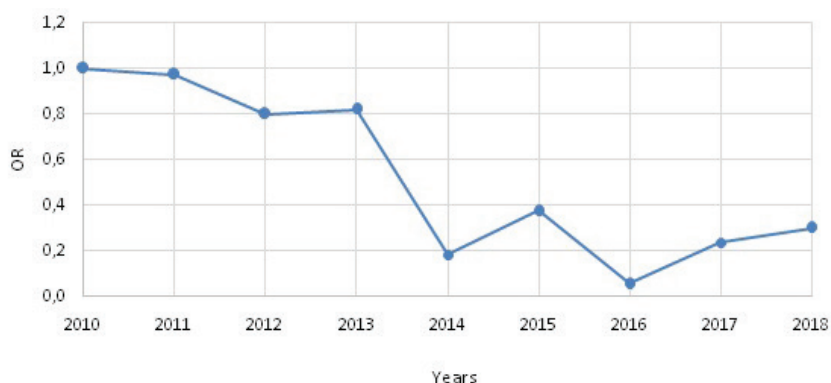


Figure 1: Plot of the odds ratios obtained as a result of comparison of mortality rates based on years (OR:odds ratio)

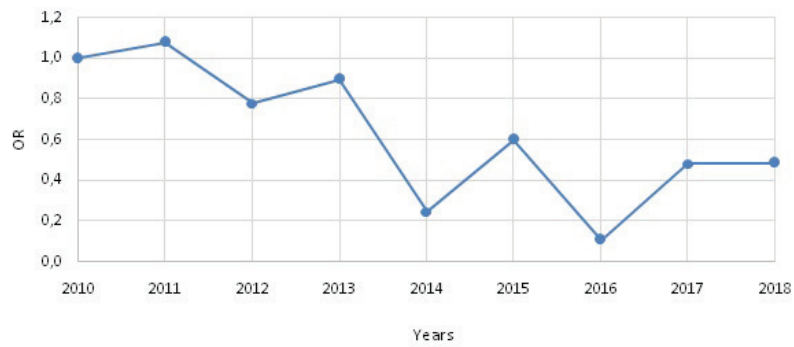


Figure 2: Plot of the odds ratios obtained as a result of comparison of mortality rates in cases reported as carbon monoxide poisoning based on years (OR:odds ratio)

Table 3 Comparison of mortality rates based on years

Years	Deceased	Living	OR
2010	24 (0.63)	3787 (99.37)	1.000
2011	21 (0.61)	3409 (99.39)	0.972
2012	18 (0.51)	3546 (99.49)	0.801
2013	16 (0.52)	3080 (99.48)	0.820
2014	4 (0.12)	3449 (99.88)	0.183
2015	8 (0.24)	3370 (99.76)	0.375
2016	1 (0.03)	2899 (99.97)	0.054
2017	3 (0.15)	2006 (99.85)	0.236
2018	5 (0.19)	2635 (99.81)	0.299

The data are expressed in the form of n (%).
OR: odds ratio

Table 4 Comparison of mortality rates in cases reported as carbon monoxide poisoning based on years

Years	Deceased	Living	OR
2010	19 (1.60)	1166 (98.40)	1.000
2011	17 (1.73)	967 (98.27)	1.079
2012	14 (1.25)	1102 (98.75)	0.780
2013	12 (1.44)	822 (98.56)	0.896
2014	3 (0.40)	744 (99.60)	0.247
2015	7 (0.97)	716 (99.03)	0.600
2016	1 (0.18)	560 (99.82)	0.110
2017	3 (0.78)	382 (99.22)	0.482
2018	4 (0.79)	504 (99.21)	0.487

The data are expressed in the form of n (%).
OR: odds ratio

Discussion

Poisoning is responsible for deaths in especially in low-income countries. Incidence of poisoning varies and clinical outcome of these patients is not well reported. Although it is considered as a global burden, the nature of poisoning may vary in different areas across the world (10,11)

Previous studies found the rate of women among all cases admitted to emergency departments for poisoning to be higher (5). In agreement with the literature, the rate of women among the 28281 cases that were examined in this study was 56.41% (n=15927), while the rate of men was 43.59% (n=12354).

The etiology of poisoning may vary based on regional differences. Various previous studies investigated the factors of poisoning and reported that drug-related poisoning had the highest rate (12, 13). Our study also found that poisoning cases related to therapeutic drugs were the most frequent ones (n=11243, 39.75%). Additionally, in our study where the data on a period of 8 years were analyzed, it was found that the rates of poisoning cases related to therapeutic drugs increased significantly in comparison to other types of poisoning cases through the years (p<0.001).

Among the other factors, carbon monoxide had the second highest rate (n=7043, 24.90%), while food poisoning had the third place (n=4953, 17.51%). In a study by Özköse et al., the most frequently encountered factors for poisoning were in the order of drugs, CO inhalation and foods, which was a similar result to that in our study (5).

Where there was a general increase in the rates of poisoning by addictive substances through the years, this increase was more noticeable in 2013. It is believed that the reason for this increase in these years was synthetic cannabinoids with increased usage in our country as in the world after 2011 (14). Emergency service visits related to usage of synthetic chemicals (SC) has increased in many countries since the year 2010 (15-17). As SC are easily accessible and inexpensive, their popularity and frequency of usage have increased (18). Likewise, according to our findings, there was a tendency for a decrease in SC usage starting with the year 2016. It is believed that the legal regulation on the topic in 2015 was effective on this decrease (19).

The study by Mert et al. reported the incidence of poisoning-related mortality as 2.5% (3). The mortality rate in the 28281 cases of poisoning in our study was

found as 0.35% (n=100). In our study, where the data on eight years were examined, it was observed that the mortality rates decreased throughout the years. Among the total deaths in our study (n=100), the most frequently encountered cause was carbon monoxide poisoning (n=80, 80%), while the mortality rate among the cases who were admitted due to CO poisoning was 1.14%.

Conclusion

It is considered to be a positive development that the rates of poisoning cases related to CO, foods, mushrooms and poisonous/venomous animals and the mortality rates in all cases of poisoning have decreased. This can be related with the educational factors especially in media about the poisoning mushrooms taken from mountains and the increasing consciousness for wild animal bites. Nevertheless, there were significant increases in cases of poisoning related to therapeutic drugs, household chemicals, addictive substances and hydrocarbon compounds. In our opinion many factors contribute to this aspect such as the psychological problems of people and the increasing demand for addictive substances. We believe that this study will contribute to determination of healthcare policies by attracting attention to the changes in the etiologies of cases of poisoning.

Limitations

The data collected by the Provincial Directorate of Health by "18/C Intoxication Case Reporting Forms" from patients who visited emergency departments were obtained from this institution and analyzed. As the unreported patients and those with missing data due to failure in record-keeping were excluded from the study, the number of patients that were examined in the study was lower than the number of all cases of poisoning in the same period.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article. Availability of data and materials

All materials taken from other sources (including our own published writing) were clearly cited.

Informed consent

Written informed consent was not needed for the col-

lected data as no personal information was mentioned in the text.

Ethical approval

This study was initiated in the emergency department of a university hospital following the Provincial Directorate of Health approval.

Human rights

Our work does not infringe on any rights of others, including privacy rights, and intellectual property rights. There is no human rights violation in the study.

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