

Deaths From Drug Overdose and Toxicity in Turkey 1997–2001

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Abstract: Turkey is located on the main overland connection between Asia and Europe, making the country potentially vulnerable to drug trafficking and its associated harms. The aim of the present study is to explore the frequency of all deaths from drug overdose and toxicity in Turkey and to describe some of the characteristics of these deaths.

We collected data on all deaths from drugs in Turkey between 1997 and 2001 using records from the Council of Forensic Medicine. Data obtained from autopsy reports were retrospectively analyzed. In the present study, 374 deaths from drugs were reported in Turkey, with a mortality rate of 0.17 per 100,000 population. Highest mortality rates were found in Istanbul (0.83) and Gaziantep (0.71). The mean age was 34.0, and most cases (71.7%) were below the age of 40. The proportion of female cases was 13.6%. Opiates were implicated in 91.5% of deaths and benzodiazepines in 25.9%. Two fifths (38.8%) of the cases involved use of more than 1 drug. In 36.6% of cases, the route of final drug administration was by injection. The most common location of death was at a home (33.7%). Interventions to reduce drug use nationally are urgently required. International cooperation in social-educational activities, scientific research, and security measures is essential for this war.

Key Words: forensic medicine, forensic autopsy, drug-related death, overdose, polypharmacy, toxicity, Turkey

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Drugs are being used by all cultures and at all socioeconomic levels, and they are distributed throughout the world via specific routes. Although there is variation between countries, the number of drug-related deaths throughout the world has risen markedly in recent years.^{1–6} Most narcotics are produced in the “Golden Crescent” (Iran, Afghanistan, and Pakistan) and “Golden Triangle” (Laos, Thailand, and Burma). Geographically, Turkey is located on the Balkan Route, which is historically the main overland connection between Asia and Europe. Seventy percent of the world’s opiates are produced in Afghanistan and 23% in Burma.⁷ In

2000, Turkey was ranked 15th in the world in terms of the amount of opiate seized.⁵ Turkey is located on the main overland connection between Asia and Europe (Balkan Route), making the country potentially vulnerable to drug trafficking and its associated harms.

There has been no research estimating the number of drug users and drug-related deaths in Turkey.⁸ All research concerning drug-related deaths has been carried out in Istanbul. Results of these studies show that, although there are fluctuations, the number of drug-related deaths in Turkey has increased in recent years.^{9–12} Medicolegal autopsies, including toxicologic examinations, are the most useful sources of information on drug-related deaths. Continual collection and evaluation of such information reveals trends in fatal drug intoxication and may be used to evaluate the risk of drugs used in society and to formulate governmental drug-approval policies.¹³ The number of deaths is an important parameter in the evaluation of the drug problem in a country.^{2,14}

The aim of the present study is to explore the distribution of all the deaths from drug overdose and toxicity in Turkey, as well as the effects of Turkey’s location in the international drug map.

MATERIALS AND METHODS

This study is registry-based descriptive research on all reported deaths from drug overdose and toxicity in Turkey for the period of 1997–2001. Three cases who died abroad were excluded from this study. The cases were included the study when their main cause of death was either drug toxicity or overdose.

All deaths due to poisoning or suspected poisoning (suicide, homicide, or accident) are of medicolegal interest in Turkey. According to Article 83 of “Methods of Criminal Judgment Law,” a medicolegal toxicology analysis must be performed after an autopsy to confirm the cause of death. According to Article 152 of the same law, all suspected deaths must be reported, and Articles 79 and 81 require autopsy for all legal deaths. Because of these legal arrangements, all fatal events caused by any intoxication, including drug usage, are recorded and investigated officially in Turkey.

In Turkey, there are 7 postmortem regional toxicologic laboratories (Istanbul, Ankara, Adana, Bursa, Izmir, Trabzon, and Malatya) belonging to the Council of Forensic Medicine, which provide official expertise to Turkish Ministry of Justice. No other institutions in Turkey are able to perform postmortem toxicologic analysis. The data were obtained

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from original reports of autopsies held by the registries of each regional laboratory. Data obtained from autopsy reports dated between 1997 and 2001 were retrospectively analyzed. Additionally, the reports of the Fifth Committee of Council of Forensic Medicine covering the same time period were also examined. The Fifth Committee offers expertise on poisonings, allergies and immunology, paternity tests, prescription drugs, food, sleeping agents, and narcotic drugs.

Since all deaths from drug use, other suspicious deaths, and all trauma-related deaths are considered medicolegal, our study group most likely includes almost all deaths from drug use in Turkey. After toxicologic analysis, cases proven to have died of drug overdose and toxicity were included in this study. Other causes of death were excluded from the study, even if drugs had been found in the body. The samples were analyzed using analytical methods, including thin layer chromatography (TLC) and gas chromatography with mass spectrometry (GC/MS). Mortality rates were calculated for the population aged 15 and over (per 100,000 population).

The cases were described by time (year), place (provinces), and personal characteristics (age and sex). Information included the types of drugs detected at autopsy, polypharmacy, drug use in combination with alcohol, type of sample (blood, urine, and tissue), location of death, manner of death, and the route of final drug administration. Data were evaluated using Statistical Package for the Social Sciences (SPSS) for Windows 10.0.

RESULTS

Between 1997 and 2001, a total of 3875 deaths due to intoxication were reported. Of these, there were 374 (9.7%) deaths from drug overdose and toxicity.

In the study, 374 deaths from drugs were reported in Turkey, with a mortality rate of 0.17 per 100,000 population (≥ 15 years old). Highest death rates (0.83 per 100,000) were found in Istanbul, Turkey's most populous city, and Gaziantep, the largest province in southeastern Turkey, at 0.71 per 100,000 population.

The distribution of the drugs detected at autopsy is presented in Table 1. Opiates (morphine 333, heroine 6, codeine 3, fentanyl 2, and methadone 1) were implicated in 91.5% of

TABLE 1. The Distribution of the Drugs Detected at Autopsy

Type of Drug	No. of Deaths	% of Deaths
Opiates	203	54.3
Benzodiazepines	12	3.2
Opiates + benzodiazepines	79	21.1
Opiates + cannabis	9	2.4
Opiates + barbiturates	4	1.1
Opiates + alcohol	47	12.6
Benzodiazepines + alcohol	6	1.6
Others	8	2.1
Undetermined	6	1.6
Total	374	100.0

TABLE 2. The Distributions of Age Groups, Gender, and Province of the Deaths

Characteristics	No. of Deaths	% of Deaths
Age groups (years)		
15–19	19	5.1
20–24	55	14.7
25–29	78	20.9
30–34	64	17.1
35–39	53	14.2
40–44	37	9.9
45–49	30	8.0
50–54	19	5.1
55–59	10	2.7
60–64	3	0.8
≥ 65	4	1.1
Unknown	2	0.5
Gender		
Male	323	86.4
Female	51	13.6
Provinces		
Istanbul	286	76.5
Gaziantep	30	8.0
Antalya	6	1.6
Bursa	5	1.3
Adapazari	5	1.3
Other (22 provinces)	42	11.3
Remaining 54 provinces	0	0.0

deaths and benzodiazepines in 25.9%. Two fifths (38.8%) of the cases involved use of more than 1 drug (polypharmacy).

Table 2 shows the distributions of age groups, gender, and province of the deaths. The mean age at death was 34.0 years (range 17–79), with 71.9% being under the age of 40.

Only 27 (33.3%) provinces among a total of 81 in Turkey had deaths from drugs. In 1997, deaths were reported from only 9 provinces, while this had increased to 15 by 2001 (data not shown). Istanbul, the largest province in the country, reported the most drug deaths (76.5%), and Gaziantep, the largest province in the southeastern Turkey, reported 30 deaths (8%). Antalya, the most important tourist center in the Turkish Mediterranean, reported 6 deaths (1.6%).

Females died at a younger age than males (28.9 versus 34.0). The distribution of deaths by age and gender is provided in Figure 1.

Figure 2 shows the gender distribution of deaths from drugs by year. There is a decrease in 1998 and 1999; however, there was a considerable increase in the years 2000 and 2001.

In 137 cases (36.6%), needles were found on or nearby the corpse and included traces of injection on hands, cubital fossae, and arms, indicating that the final drug administration was by injection. Oral and/or nasal use was reported in 237 cases (63.4%).

Table 3 displays the sites where the victims were found. In 108 cases (28.9%), the location of death was not stated in the autopsy reports. The manner of death could be determined

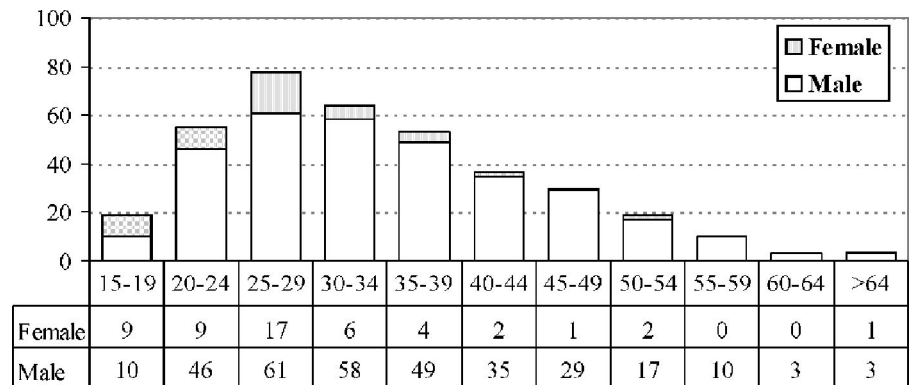


FIGURE 1. The distribution of deaths by age groups and gender.

only in 85 cases (22.7%). These are suicides in 13 cases (3.4%) and accident in 72 (19.3%) (data not shown).

Drug metabolites were found both in urine and blood samples of 275 cases (73.5%), in blood only for 36 cases and in urine only for 32 (Table 4). The mean morphine concentration of cases was 5.15 mg/L (range 0.06–136 mg/L) in blood.

DISCUSSION AND CONCLUSION

Annual mortality rate from drug deaths in Turkey was found as 0.17 per 100,000 population (>15 years old) for the period of 1997–2001. In this study, it is not possible to calculate the specific mortality rate of drug users because a certain number of drug users in Turkey was not known. Yet, it is possible to tell the death rate of Turkey is lower than most western countries and the United States.^{2,3,6,15} The relatively low drug-related death rate in Turkey does not suggest that drug use is not a health problem for the community.

An increase in the number of deaths from drug deaths in recent years was shown by other research from Istanbul, as in our study, although there was a decline in 1998 and 1999 (Fig. 1).^{9–12,16} Increases in death rates may also be explained by the factors of, for example, decreases in heroin prices² or the Croatia war in 1995.¹⁷ Fluctuations in the number deaths may be related to economic crises and changes in purchasing power. Similar studies show an increase in deaths from drug rates in western countries and Australia.^{2,3,18} Only a Saudi Arabian study from 1990–1997 reported a considerable decrease after 1992.¹⁹ This decrease was thought to be a result

of educational programs and the introduction of the death penalty for drug trafficking.

In Turkey, cannabis is traditionally the most frequently used drug. Use of synthetic opiates and heroin follow cannabis in terms of frequency of use.⁸

The cause of death was related to opiates in 345 (91.5%) cases and to benzodiazepines in 97 (25.9%) cases, as in the other studies conducted in Istanbul.^{10–12,16,20} Polypharmacy use was found in 145 (38.8%) cases. The average number of drugs detected in fatal cases is 2.4 in Norway, 3 in Sweden, and more than 3 for the majority of the cases in the United Kingdom.^{2,21} Heroin users tend to use benzodiazepines to reduce anxiety and agitation caused by both organic and social influences.³ It has been reported that benzodiazepines enhance the effect of opiates, and this may be a factor that leads people to take benzodiazepines and opiates together.^{3,19,22} In our study, opiates and benzodiazepines are generally (21.1%) taken together; which confirms the findings of other studies.^{1,3,12,14,23,24} The combination of alcohol and drug use is also high (14.2%) in our research, as in the other studies from Istanbul.^{10,11,20,25} Alcohol was detected in 39% of heroin-related deaths in Sydney.²³ Alcohol taken together with extreme doses of opiate is reported to increase fatalities.^{6,17,21,23,26,27} Levine et al²⁶ found that even a small amount of alcohol with heroin is a risk factor. Drugs other than opiates are consumed much less in Turkey, according to the other western countries.^{2,21}

In our study, most deaths were among populations under 40 (71.7%), and the mean age was 34. The mean age is

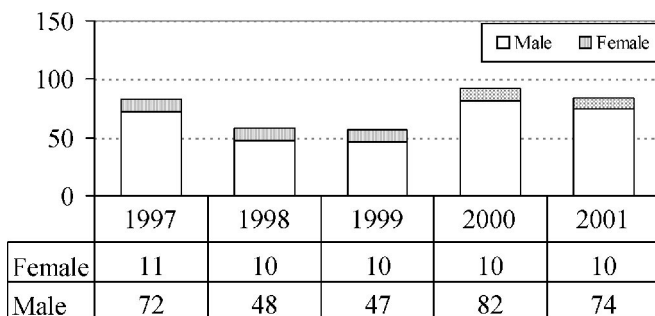


FIGURE 2. Gender distribution of deaths by years (1997–2001).

TABLE 3. The Distribution of the Deaths by the Place

Place	No. of Deaths	% of Deaths
House	126	33.7
Public place (park, garden, etc)	52	13.9
Hotel or boarding house	34	9.1
Public toilets	13	3.5
Workplaces	8	2.1
In the car	5	1.3
Hospitals	15	4.0
Others	13	3.5
Unreported	108	28.9
Total	374	100.0

TABLE 4. The Distribution of the Samples of Drugs

Samples	No.	%
Urine and blood	275	73.5
Blood	36	9.6
Urine	32	8.6
Blood and tissue	9	2.4
Urine and tissue	4	1.1
Tissue	7	1.9
Tissue and stomach content	5	1.3
Undetermined	6	1.6
Total	374	100

similar to that reported from Nordic countries and Australia,^{1,2,23} but slightly higher than the 30.6 figure from the United Kingdom.²⁸

Drug abuse is widespread among the male population in Turkey.^{8,29,30} In our study, females accounted for 13.6% of drug-related deaths. Social and cultural values traditionally discourage alcohol and drug use among Turkish women, like the example of Saudi Arabia.¹⁹

The most common methods of drug use in Turkey are by oral or nasal use,^{5,30,31} while injection has been reported as the major route of drug use in other countries.^{1,32,33} In our study, in 36.6% of cases, the route of final drug administration was by injection. Other clinical studies conducted in Turkey report that drug abuse by means of injection varies from 24% to 40%.^{30,34} In Turkey, the main form of heroin administration is by the nasal route (38%), followed by injection (33.9%), sniffing/snorting (14.9%), and smoking (13.2%).⁸

We found deaths from drugs occurring in closed areas such as houses, hotel rooms, boarding houses, offices, toilets, or public areas like gardens, parks, and fields. Our observations are in agreement with other studies,^{3,11,14,16,20,35} except the one reporting that the majority of deaths in southwestern Sydney over the study period occurred in public settings, with the street environments being the most common.¹

Previous studies in Istanbul found that reporting of site of deaths was inadequate, and autopsy minutes were not always delivered to autopsy teams.^{36,37} We found in our study that information with regard to site of death was not recorded in 28.9% of the autopsy minutes; this rate is higher than the results from other studies (20%–23%) conducted in Istanbul.^{10,16,20} This is because it is difficult to access and obtain police records from many parts of Turkey.

Manner of death may not be detected in a great rate of events as 77.3%. It may be concluded that in fatal cases of drug use, it is hard to define the manner of death. For most events, it could not be possible to distinguish whether the manner of death was an accident or suicide.³⁸

In our study, metabolites of drugs were detected in 83.2% of urine samples. This implies that an attempt must be made to obtain urine at all times. When empty, the bladder must be irrigated and the fluid must be sent for analysis. For 15.2% of fatalities, drugs were found in samples other than urine; therefore, all the samples should be taken from the

body. Important ones include skin on which there are injection sites, muscular tissues under the skin, urine, blood, inner organs, etc.^{10,19} Toxicologic analyses should be performed on all suspicious deaths in regions where drug use is widespread.

In this study, the mean blood morphine concentration of cases (5.15 mg/L) was higher than in other studies (range, 0.06–136 mg/L).^{1,3,39} Chronic heroin usage may be reflected by a high bile morphine level of greater than 40 mg/L.⁴⁰ Darke and colleagues¹ reported a significant increase in morphine concentrations between 1992 and 1996 in New South Wales, Australia. The increase in median blood morphine concentrations corresponds to an increase in the purity of heroin in Sydney.⁴¹ There was no significant difference between the blood morphine concentrations of noninjectors and other cases.³⁹

Over the 5-year study period, deaths from drug were reported only in 27 out of 81 provinces in Turkey. Of these, only 2 provinces (Istanbul and Gaziantep) had much higher drug-related death rates than the national average (respectively, 0.83 and 0.71 per 100,000). Both provinces have also the highest prevalence of heroin use according to police registries.³¹ This can be explained by the wide availability and easy accessibility of drugs.

According to the Ministry of Justice statistics, crimes related to drugs, such as use, sale, and purchase of narcotics, were reported in 71 provinces of 81 (86.4%) in 2000. There was an increase of 47.4% in the arrest rates for these kinds of crimes from 1997 to 2000. In 2000, 2419 persons (2361 male and 58 female) were reportedly arrested and imprisoned for drug offenses.⁴² The crimes related to drugs showed a significant increase in recent years in Turkey.⁴² One possible explanation might be that when the use of drugs starts in a specific geographical area, this encourages users and sellers to gather there, increasing drug use rates, and as a result the number of deaths from drugs rises.

In conclusion, we do not know the extent of real drug use in Turkey. The prevalence of drug abuse is still low when it is compared with other European countries and the United States,^{25,43,44} although the epidemiologic and other data show that prevalence of drug use has been increasing.^{8,29,30}

The typical age of first-time use has decreased over the years in Turkey.⁸ Generally, for all drugs the age of first-time use was younger than 25 years.⁸ The typical age at first-time use of cannabis is reported as 16, and around 20 years for heroin use.⁸ From these causes, it seems like the drug abuse and consequences will be a greater problem in later decades. Interventions to reduce drug use nationally are urgently required. As long as drug use cannot be controlled, fatalities will continue. However, it seems Turkey has still not been affected from this position at a specific drug route; it may be related to socioeconomic and cultural factors. International cooperation in social-educational activities, scientific research, and security measures is essential for this war.

REFERENCES

1. Darke S, Ross J, Zador D, et al. Heroin-related deaths in New South Wales, Australia, 1992–1996. *Drug Alcohol Depend.* 2000;60:141–150.
2. Steentoft A, Teige B, Ceder G, et al. Fatal poisoning in drug addicts in the Nordic countries. *Forensic Sci Int.* 2001;123:63–69.

3. Gerostamoulos J, Staikos V, Drummer OH. Heroin-related deaths in Victoria: a review of cases for 1997 and 1998. *Drug Alcohol Depend.* 2001;61:123–127.
4. European Monitoring Centre for Drugs and Drug Addiction. Annual report on the state of the drugs problem in the European Union on Norway (2002). Available at: <http://www.emcdda.eu.int>. Accessed December 2, 2004.
5. United Nations Office on Drug and Crime. Global illicit drug trends 2002. Available at: <http://www.unodc.org/pdf/report-2002-06-26-01>. Accessed November 15, 2004.
6. Coffin PO, Galea S, Ahern J, et al. Opiates, cocaine and alcohol combinations in accidental drug overdose deaths in New York City, 1990–1998. *Addict.* 2003;98:739–747.
7. Turkish custom prevention general directory. *Addicts Chem Ankara.* 2003;28–33.
8. United Nations Office on Drugs and Crime. Health services, education and community action: preventing drug abuse in Turkey, national assessment of drug abuse (based on studies conducted in 6 major cities) 2003. Available at <http://www.unodc.org>.
9. Elmas I, Sozen S, Ozer C, et al. Deaths from overdose drug use. In: Kulusayin O, ed. *Poster Presentations Book: 7th National Forensic Medicine Meeting, November 1–5, Antalya, Turkey.* 1993:275–283.
10. Kulusayin O, Cetin G, Azmak D, et al. Narcotic drugs-associated deaths in the forensic autopsy material in Istanbul [in Turkish]. *J Forensic Med.* 1993;9:45–51.
11. Agritmis H, Yayci N, Ulukan O. Deaths of drug addict between 1998–2000. In: Canturk G, Agiritmis H, eds. *Congress Book: Annual Forensic Medicine Meetings, May 16–19, Antalya, Turkey.* 2002:167–174.
12. Toprak S, Akgul E, Sam B. The poly-drug use in deaths of addict. In: Canturk G, Agritmis H, eds. *Congress Book: Annual Forensic Medicine Meetings, May 16–19, Antalya, Turkey.* 2002:93–98.
13. Teige B, Kaa E, Bugge A. A comparison of drug-related deaths in Oslo, Norway and Aarhus, Denmark. *J Forensic Sci Soc.* 1988;28:311–319.
14. Kringsholm B. Deaths among drug addicts in Denmark in 1968–1986. *Forensic Sci Int.* 1988;38:139–149.
15. Kringsholm B, Kaa E, Steentoft A, et al. Deaths among drug addicts in Denmark in 1987–1991. *Forensic Sci Int.* 1994;67:185–195.
16. Inanici MA, Birgen N, Aksoy ME, et al. Drug-related deaths in Istanbul, Turkey. International Association of Forensic Science, 15th triennial meeting, August 22–28, Los Angeles, CA; 1999.
17. Definis-Gojanovic M, Kovacic Z. Deaths of drug addicts in Split. *Arh Hig Rada Toksikol.* 1996;47:281–288.
18. Hall W, Darke S. Trend in opiate overdose deaths in Australia 1979–1995. *Drug Alcohol Depend.* 1998;52:71–77.
19. Elfawal MA. Trends in fatal substance overdose in eastern Saudi Arabia. *J Clin Forensic Med.* 1999;6:30–34.
20. Sam B, Koc S, Sen H. Poly-drug intoxication in Forensic Medicine Association. In: Canturk G, Agiritmis H, eds. *Congress Book: Annual Forensic Medicine Meetings, May 16–19, Antalya, Turkey.* 2002:406–408.
21. Gossop M, Stewart D, Treacy S, et al. A prospective study of mortality among drug misusers during a 4-year period after seeking treatment. *Addict.* 2002;97:39–47.
22. Forsyth AJM, Farquhar D, Gemmell M, et al. The dual use of opioid and temazepam by drug injectors in Glasgow. *Drug Alcohol Depend.* 1993;32:277–280.
23. Sheedy DL, Garrick TM, Nurs B, et al. Changing trends in heroin-related deaths in Sydney, Australia: 1995 to 1999. *Am J Addict.* 2003;12:52–59.
24. Ross J, Darke S. The nature of benzodiazepine dependence among heroin user in Sydney, Australia. *Addict.* 2000;95:1785–1793.
25. Ogel K, Uguz S, Sir A, et al. Cannabis use prevalence among primary and secondary school children in Turkey. *Bagimlilik Dergisi [J Dependence].* 2003;4:15–19.
26. Levine B, Green D, Smialek JE. The role of ethanol in heroin deaths. *J Forensic Sci.* 1995;40:808–810.
27. Darke S, Zador D. Fatal heroin overdose: a review. *Addict.* 1996;9:1765–1772.
28. Ghodse H, Oyefeso A, Kilpatrick B. Mortality of drug addicts in the United Kingdom 1967–1993. *Int J Epidemiol.* 1998;27:473–478.
29. Ogel K, Tamar D, Cakmak D. An overview of Turkey's situation in substance abuse problem. *Turk Psikiyatri Derg [Turkish J Psychiatry].* 1998;9:301–307.
30. Ogel K, Tamar D, Evren C, et al. Characteristics of drug abusers: a multicenter study in Turkey [in Turkish]. *J Psychiatry Psychol.* 1999;7(appendix 4):1–64.
31. Anti-smuggling and organized crime department: Turkish drug report, 2000, Ankara. Available at: <http://www.kom.gov.tr>.
32. Bargagli AM, Sperati A, Davoli M, et al. Mortality among problem drug users in Rome: an 18-year follow-up study, 1980–97. *Addict.* 2001;96:1455–1463.
33. Pompidou Group. Multi-City Study: Drug Misuse Trends in Thirteen European Cities. Council of Europe Press; 1994. Available from: <http://http://www.coe.int>.
34. Ergil D. *Profile of drug addiction and resistance in Turkey: UN Report, Ankara.* 1993.
35. Webb L, Oyefeso A, Schifano F, et al. Cause and manner of death in drug-related fatality: an analysis of drug-related deaths recorded by coroners in England and Wales in 2000. *Drug Alcohol Depend.* 2003;72:67–74.
36. Ozaslan A, Afacan I, Arslan H, et al. Importance of pre-autopsy information [in Turkish]. *Adli Tip Derg [J Forensic Med].* 2000;14:1–6.
37. Asirdizer M, Canturk G, Sari H, et al. Problems in the investigation of crime scene in death cases and proposals for the solution of these problems [in Turkish]. *Adli Tip Derg [J Forensic Med].* 2001;15:45–54.
38. Steentoft A, Tiege B, Holmgren P, et al. Drug addict deaths in the Nordic countries: a study based on medicolegally examined cases in the 5 Nordic countries in 1991. *Forensic Sci Int.* 1996;77:109–118.
39. Darke S, Ross J. Fatal heroin overdose resulting from non-injecting routes of administration, NSW, Australia, 1992–1996. *Addict.* 2000;95:569–573.
40. Rutenber AJ, Kalter HD, Santinga P. The role of ethanol abuse in the etiology of heroin-related death. *J Forensic Sci.* 1990;35:891–900.
41. Weatherburn D, Lind B. The impact of law enforcement activity on a heroin market. *Addict.* 1997;92:557–569.
42. State Institute of Statistics. *Judicial Statistics 2000.* Ankara: State Institute of Statistics Prime Ministry Republic of Turkey; 2001.
43. United Nations Office on Drugs and Crime. World drug report. Available at: http://www.unodc.org/pdf/WDR_2004/Chap6_drug_abuse.pdf. Accessed: August 21, 2004.
44. Akvardar Y, Demiral Y, Ergor G, et al. Substance use in a sample of Turkish medical students. *Drug Alcohol Depend.* 2003;72:117–121.