

A Comparative Clinical Diagnostic Examination of Deceased Poisoned Patients in Baharloo Hospital Through Autopsy and Toxicology at Tehran's Medico-Legal Organization During 2014-2015

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Received: 24 Dec. 2018; Accepted: 08 Jun. 2019

Abstract- Acute poisoning is nowadays a common medical emergency. The important point about admitting patients with acute poisoning is its timely and early diagnosis. However, the rate of consistency between clinical diagnosis and autopsy of patients with acute lethal poisoning has not been investigated broadly. The goal of this study was to compare the clinical symptoms of poisoned deceased patients through autopsy and toxicology at Tehran's Medico-Legal Organization. A cross-sectional study was conducted on all the admitted poisoning cases at Baharloo Hospital in 2014 to 2015 who passed away and were referred to Kahrizak Autopsy Hall. Through investigating the medical records of the Hospital and Autopsy Hall, the researcher examined and compared the existent files. The collected data were entered into SPSS 16. Data were analyzed using Cohen's kappa coefficient. In all, 98 people who had died from acute poisoning were investigated. The most common causes of poisoning were drugs (49%), followed by pesticides (39%). The least common cause of poisoning was alcohol (1%). The most common poisonous drugs were opioids. The most common causes of death based on hospital records and autopsy results were rice tablets and high-dose opioid poisoning. Using Cohen's kappa coefficient, the rate of agreement between the causes of death in hospital records and autopsy results was estimated at 0.744. Bearing in mind the consistency of clinical diagnosis with postmortem autopsy results, we may begin life-saving management of patients of acute poisoning in the shortest possible time.

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Acta Med Iran 2019;57(6):363-367.

Keywords: Poisoning; Aluminum phosphide; Clinical diagnosis; Autopsy

Introduction

Acute poisoning is nowadays a common medical emergency (1,2) and constitutes approximately 1 to 5 percent of patients attending general hospitals (3-5).

Annually, approximately 3 million pesticide poisonings occur across the world, of which 220000 results in death (6), and many of these poisonings were conscious. The pattern of poisoning varies across different countries as they have different cultures and races. Generally, the most common causes of adult poisoning in developed countries and in particular European countries are drug-related (7,8). However, in developing countries, pesticide poisoning is the most common type of poisoning (9). Also, in Iran, most common causes of death from poisoning were pesticides

(10). The important point about admitting patients with acute poisoning is its timely and early diagnosis. Administering the appropriate treatment in medical centers is vital for saving the patient's life. Usually, in medical centers, the diagnosis of poisoning is based on the patient's history and general and specific symptoms. Eventually, blood and urine tests can hint at the poisoned person's metabolic status. However, some cases of acute poisoning that result in death do not reach a definite diagnosis at the bedside and are definitely diagnosed by the medico-legal organization. In fact, we may conclude that, since the range of acute poisoning symptoms are very wide, and that poisoned cases attend general hospitals, medico-legal centers function better than medical centers in identifying the definite cause of death in acute lethal cases. However, the rate of

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A comparative clinical diagnostic examination of deceased poisoned patients

consistency between clinical diagnosis and autopsy of patients with acute lethal poisoning has not been investigated broadly.

Considering the differences between various cultures and communities in patterns of acute poisoning, the high percentage of poisoned patients in medical wards, and the certainty of medico-legal diagnoses, a comparative study of the diagnosis of clinically and medico-legally based cases of poisoning seem to be necessary. The goal of this study was to comparatively analyze the clinical diagnosis of deceased poisoned patients, autopsy, and toxicology results of the medico-legal organization.

Materials and Methods

In a cross-sectional study, random systematic sampling was done, and samples were selected from all the patients admitted to Baharloo Hospital for poisoning between March 2014 and September 2015. The researchers looked up the archives of the Hospital and Kahrizak's Autopsy Hall to review the cases.

The study population consisted of all the poisoned cases admitted to Baharloo Hospital between March 2014 and September 2015, who eventually died from poisoning and were referred to Kahrizak Autopsy Hall for autopsy.

Inclusion criteria: individuals with an initial diagnosis of acute poisoning, individuals deceased due to poisoning, those with medical records containing complete information in the Hospital archives, and those with samples sent to the medico-legal organization.

The sample size was estimated at 97 with an α error of 5% and a β error of 20%. The researchers referred to the archives of the Hospital and Kahrizak's Autopsy Hall for the aforementioned duration until the desired sample size was reached. Clinical symptoms, clinical examinations, laboratory tests, clinical diagnosis, the curative measures taken and the medications used were examined from the files. Then, the researcher examined the forensic records of these individuals; the autopsy, toxicology and in some cases pathology results of the deceased cases that were registered in the medico-legal organization. The final cause of death based on autopsy and toxicology results was compared with the clinical symptoms and diagnosis registered in Baharloo Hospital's files. We collected data using our special forms which included the following items: clinical

symptoms, clinical examination, laboratory tests, patient history, probable positive symptoms, curative measures taken, drugs/medication used, hospital diagnosis, patients' autopsy results, toxicology and pathology results, and the final cause of death based on autopsy, toxicology and pathology results. The collected data were entered into SPSS 16. Frequency and frequency percentages were calculated for qualitative variables, and mean, and standard deviation (SD) were calculated for quantitative variables. Data analysis was performed using Cohen's kappa coefficient.

Results

Overall, 98 deceased cases of acute poisoning were investigated. The mean age of the samples was 40.1 (± 17.8 SD) years. Twenty-five (25.5%) patients were female, with a mean age of 34.7 (± 15.8 SD) years, and 73 patients were male, with a mean age of 41.9 (± 18.2 SD) years.

The most common cause of poisoning was drug overdosage (49%), followed by pesticides (39%). The least common cause of poisoning was alcohol (1%). Table 1 shows the poisonous factors in the cases under study.

The most common poisonous drugs among men were opioids (43%). Among women, they were analgesics, hypnotics, and antipsychotics (8%). Among drug poisoning, the youngest mean age affected was 17-year-old women who had been poisoned with analgesics. The highest age affected was observed among men (48-year-old) who had been poisoned with psychotropic substances.

The most common cause of death based on hospital records was poisoning with the rice tablet (39%) and high-dose opioid poisoning (26%). The most common cause of death based on autopsy results was very similar to the hospital records. The table below illustrates the causes of death based on hospital records *and* autopsy results separately.

The rate of consistency of the aforementioned causes of death was 89.8% among the cases under study. Using Cohen's kappa coefficient, the rate of agreement between the causes of death in hospital records and autopsy results was estimated at 0.744.

Table 1. Age and gender characteristics of acute poisoning patients in Baharloo Hospital

	Gender	Frequency	Percent	Age (\pm SD)	
Poisoning Agent	Drugs	Female	10	10.2	38.44(\pm 13.3)
		Male	39	39.7	46.09(\pm 16.9)
	Pesticides	Female	13	13.2	28.75(\pm 10.9)
		Male	26	26.5	32.13(\pm 16.0)
	Respiratory Poisoning	Female	2	2	29.50(\pm 7.7)
		Male	5	5.1	32.2(\pm 6.8)
	Corrosive	Female	1	1.0	83.0
		Male	1	1.0	82.0
	Alcohol	Female	0	0	--
		Male	1	1	55.0
	Total	Female	26	26.5	34.71(\pm 15.8)
		Male	72	73.5	41.9(\pm 18.2)
Total		98	100	40.36(\pm 17.8)	

Table 2. Causes of death in patients after acute poisoning based on hospital records and autopsy in baharloo hospital

	Cause of death based on hospital records		Cause of death based on autopsy	
	Frequency	Percent	Frequency	Percent
Rice tablets poisoning	39	39.7	39	39.7
Opioid intoxication	26	26.5	26	26.5
Drug toxicity	6	6.1	4	4
Cerebral hemorrhage after hypertension	6	6.1	7	7.1
Heart attack	6	6.1	6	6.1
Stroke	0	0	2	2
Peritonitis	3	3	5	5.1
DIC	1	1	1	1
Unknown	2	2	0	0
Paraguat poisoning	1	1	1	1
Respiratory failure	2	2	4	4
Corrosive agents	2	2	2	2
Carbon monoxide poisoning	1	1	1	1
Combining of toxic agents	2	2	0	0
Poisoning by pesticides	2	2	2	2
Zinc phosphide poisoning	1	1	1	1
Alcohol intoxication	1	1	1	1
Total	98	100	98	100

Discussion

Pesticide poisoning is more prevalent among developing countries, where agriculture is more common, and people have greater access to pesticides (11,12). In light of the prevalence of this type of poisoning, many countries have taken preventive measures in this respect (13,14). Several countries, such as Sri Lanka have banned the use of older organophosphorus compounds since 1995, and today, they offer pesticides that have lower toxicity for humans

(15).

In our study, the most common poisoning was with the rice tablet. Phosphide aluminum or the rice tablet is one of the most commonly used pesticides for preserving cereals, particularly rice (16), which is practiced in Iran (17). Rice tablet poisoning has a wide range of symptoms and signs depending on the dose and time of referral, which includes dizziness, fatigue, chest pressure, headache, confusion, nausea, anesthesia, diarrhea, ataxia, chills, drowsiness, muscle weakness, dual vision and jaundice (18,19,20). Its low price, as

well as its availability create a high potential for its abuse and leads to intentional and unintentional acute poisoning and high morbidity and (21,22) particularly those in recent years it has been increasingly used for suicide purposes (23,24). According to literature, rice tablet poisoning is more common in men (20,25). Rahbar *et al.*, observed a 60 to 40 ratio of rice tablet poisoning among men and women (26), which is consistent with our findings. Based on earlier studies, poisoning with this tablet is most prevalent among younger individuals (mean age: 31 years) (27), which is similar to our findings. The important point is that the prevalence of rice tablet-related poisonings is high as opposed to other types of poisonings. In this regard, a necessity for the prohibition of sales of this tablet in the free market and regulations which limit the easy access, in addition to consumer education, is significantly warranted. Furthermore, the agricultural sector can educate the consumers of this pesticide on reducing unintentional poisoning with it.

Among the drugs that caused poisoning, in this study, the most common were opioids. Similar to our findings, other studies have also reported this type of poisoning to be the most common type of drug poisoning, such as Dr. Shania's study (9). However, some studies have reported opioid poisoning as the second most common type of drug poisoning (28,29). According to literature, mostly, the individuals affected with this type of poisoning are middle-aged men (28,30), a finding that is consistent with ours. These statistics indicate the easy access to high-dose opioid substances. Our country is neighbor to the world's largest producer of narcotic substances and is located along their transport route. The high prevalence of narcotic substance abuse in the country warrants extensive, multi-sectoral and comprehensive planning for reducing access to these substances so that its rate of poisoning can also be reduced.

In our study, the clinical diagnosis of the type of poisoning registered in the files was highly consistent with the diagnosis following the autopsy, and Cohen's kappa coefficient was 74% upon comparing the two methods, which statistically indicates a desirable rate of agreement. This consistency is clinically very important, as the patient's cure can begin as soon as possible by referring to clinical diagnosis during the golden period to save patients from lethal poisonings. Upon relying on the clinical diagnosis, the morbidity and mortality rate resulting from poisonings can be reduced as they are treated in time, and delays in treatment are prevented. Studies show that the onset of rice pill poisoning

management is very important, and 60.9% of patients who referred after half an hour of taking rice pills, were died, while 29.4% of those who referred in less than half an hour, were died (31,32).

In light of the considerable rise of rice tablet poisoning, we recommend taking measures toward adopting more serious safety warnings and offering educational programs on the lethal and poisonous effects of aluminum phosphide tablets to all communities. Thus, the easy and cheap access to this pesticide (aluminum phosphide/rice tablets) is eventually reduced. Furthermore, since diagnostic measures are consistent with autopsy results, the need to perform an autopsy in the aforementioned patients should be re-considered.

Among lethal poisonous substances, the rate of poisoning with aluminum phosphide (rice tablet) is highly prevalent. Upon comparison, we found that the rate of consistency of clinical diagnosis at the bedside and postmortem autopsy results at the medico-legal organization was desirable.

References

1. Murray CJL, Lopez AD. The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020. Global burden of disease and injury series, vol. 1 of 10. Boston: Harvard School of Public Health, 1996.
2. Krug EG, Sharma GK, Lozano R. The global burden of injuries. *Am J Public Health* 2000;90:523-6.
3. Islambulchilar M, Islambulchilar Z, Kargar-Maher MH. Acute adult poisoning cases admitted to a university hospital in Tabriz, Iran. *Hum Exp Toxicol* 2009;28:185-90.
4. Cengiz M, Baysal Z, Ganidagli S, Altindag A. Characteristics of poisoning cases in adult intensive care unit in Sanliurfa, Turkey. *Saudi Med J* 2006;27:497-502.
5. Baydin A, Yardan T, Aygun D, Doganay Z, Nargis C, Incealtin O. Retrospective evaluation of emergency service patients with poisoning: a 3-year study. *Adv Ther* 2005;22:650-8.
6. WHO in collaboration with UNEP. Public health impact of pesticides used in agriculture. Geneva: World Health Organization, 1990.
7. Litovitz TL, Felberg L, White S, Klein-Schwartz W. 2000 annual report of the American Association of Poison Control Centers toxic exposure surveillance system. *Am J Emerg Med* 2001;19:337-95.
8. Lai MW, Klein-Schwartz W, Rodgers GC, Abrams JY, Haber DA, Bronstein AC. 2005 Annual Report of the

- American Association of Poison Control Centers' national poisoning and exposure database. *Clin Toxicol* 2006;44:803-932.
9. Shadnia S, Esmaily H, Sasanian G, Pajoumand A, Hassanian-Moghaddam H, Abdollahi M. Pattern of acute poisoning in Tehran-Iran in 2003. *Hum Exp Toxicol* 2007;26:753-6.
 10. Hassanian-Moghaddam H, Zamani N, Rahimi M, Shadnia S, Pajoumand A, Sarjami S. Acute Adult and Adolescent Poisoning in Tehran, Iran; the Epidemiologic Trend between 2006 and 2011. *Arch Iran Med* 2014;17:534-8.
 11. Peshin SS, Srivastava A, Halder N, Gupta YK. Pesticide poisoning trend analysis of 13 years: A retrospective study based on telephone calls at the National Poisons Information Centre, All India Institute of Medical Sciences, New Delhi. *J Forensic Leg Med* 2014;22:57-61.
 12. Raizada A, Kalra OP, Khaira A, Yadav A. Profile of hospital admissions following acute poisoning from a major teaching hospital in North India. *Trop Doct* 2012;42:70-3.
 13. Cha ES, Chang SS, Gunnell D, Eddleston M, Khang YH, Lee WJ. Impact of paraquat regulation on suicide in South Korea. *Int J Epidemiol* 2016;45:470-9.
 14. Eddleston M. Progress with reducing mortality from organophosphorus insecticide poisoning. *Anuradhapura Medical Journal*. 2014 30;8:1-4.
 15. Roberts DM, Karunarathna A, Buckley NA, Manuweera G, Sheriff MHR, Eddleston M. Influence of pesticide regulation on acute poisoning deaths in Sri Lanka. *Bull World Health Organ* 2003; 81:789-98.
 16. Proudfoot AT. Aluminium and zinc phosphide poisoning. *Clin Toxicol* 2009;47:89-100.
 17. A Hosseinian, N Pakravan, A Rafiei; SMFeyzbaksh; Aluminum phosphide poisoning known as rice tablet: A common toxicity in North Iran. *Indian J Med Sci* 2011;4:143-50.
 18. urjar, Mohan; Azim, Afzal; Baronia, Arvindk; Sharma, Kalpana. Managing aluminum phosphide poisonings. *J Emerg Trauma Shock* 2011;4 :378-84.
 19. Goel, A; Aggarwal, P. Pesticide poisoning. *Natl Med J India* 2007;20:182-91.
 20. Soltaninejad K, Nelson LS, Bahreini SA, Shadnia S. Fatal aluminum phosphide poisoning in Tehran-Iran from 2007 to 2010. *Indian J Med Sci* 2012;66:66-70.
 21. Chaudhry MQ. A Review of the mechanisms involved in the action of phosphine as an insecticide and phosphine resistance in stored product insects. *Pestic Sci* 1997;49:213-28.
 22. Chaudhry MQ. Review A Review of the Mechanisms Involved in the Action of Phosphine as an Insecticide and Phosphine Resistance in Stored-Product Insects. *Pest Manag Sci* 1997;49:213-28.
 23. Moghadamnia AA. An update on toxicology of aluminum phosphide. *Daru* 2012;20:25.
 24. Khodabande F, Kahane A, Soleimani G. The prevalence of complications leading to death in poisoning with rice tablet. *Iran J Forensic Med* 2014;20,27-36.
 25. Mehrpour O, Jafarzadeh M, Abdollahi M. A systematic review of aluminium phosphide poisoning. *Archives of Industrial Hygiene and Toxicology*. 2012;63:61-73.
 26. Rahbar Taramsari M, Teimourpour P, Jahanbakhsh R. The results of pathology at autopsy poisoned rice with tablets (aluminum phosphide). *J Guilan Univ Med Sci* 2011;19:56-63.
 27. Tofighi H. Medico-legal investigation of narcotics & other drug involved deaths. *Tehran Univ Med J* 1994;52:43-55.
 28. Izadi-Mood N, Tavahen N, Masoumi GR, Gheshlaghi F, Siadat ZD, Setareh M, et al. Demographic factors, length of stay, cost of hospitalization and death in patients treated with amphetamines and drugs. *J Isfahan Med Sch* 2012;29:146.
 29. Moghadamnia AA, Abdollahi M. An epidemiological study of poisoning in northern Islamic Republic of Iran. *East Mediterr Health J* 2002;8:88-94.
 30. Ahmadi A, Pakravan N, Ghazizadeh Z. Pattern of acute food, drug, and chemical poisoning in Sari City, Northern Iran. *Hum Exp Toxicol* 2010;29:731-8.
 31. Ala A, Vahdati SS, Moosavi L, Sadeghi H. Studying the Relationship Between Age, Gender and Other Demographic Factors with the Type of Agent Used for Self-Poisoning at a Poisoning Referral Center in North West Iran/Kuzey Bati Iran'da Bir Zehirlenme Referans Merkezinde Kendini Zehirlemek için Kullanılan Ajan Tipi ile Yas, Cinsiyet ve Diğer Demografik Faktörlerin İlişkinin Arastırılması. *J Acad Emerg Med* 2011;10:100.
 32. Rahbar Taramsari M, Orangipour R, Zerkami T, Palizkar M, Mousavian Roshan Zamir A. Investigating patients with rice pills poisoned. *J Guilan Univ Med Sci* 2006;14: 42-7.