

LETHALITY FROM ACUTE INTOXICATIONS WITH ORGANOPHOSPHATE PESTICIDES IN VARNA REGION FOR A PERIOD OF 15 YEARS

Zlateva S., M. Iovcheva, Marinov P.

Department of Toxicology, Naval Hospital- Varna

Reviewed by: Assoc. Prof. V. Ikonov, MD, PhD

ABSTRACT

An analysis of the lethality in cases of acute exogenous intoxications /AEI/ with organophosphate pesticides /OP/ in Varna region for a period of 15 years -1991-2005 was done. It was established that from 207 patients with acute OP poisonings there were 40 lethal cases. The frequency of the lethal cases was 19.32%. 28 /70%/ of them were men and 12 /30%/ were women. The lethality was significantly higher in men. The proportion of lethal cases in men and women was 2.33: 1. The average age of deceased patients was 59 years. It was reported that with growing up of the age the average lethality had grown bigger too. All the lethal poisonings were by an oral ingestion. In 35 cases /87.5%/ suicidal attempts were done and in 5 cases /12.5%/ accidental household poisonings took place. The main reason about the death was a development of syndrome of multiorgan insufficiency /SMOI/.

Keywords: acute intoxication, organophosphorus pesticide, lethality

INTRODUCTION

The widespread use of OP and their significant toxicity determine the high frequency of intoxications in some countries. /8,19, 22, 24/. During recent years in Varna region the relative share of OPAEI has grown smaller. /3/. The hospital lethality from these intoxications varies in different studies and is in the range within 20% and 25%. /1,11,12,18, 23,26/. OP are the cause of 10% to 46% of the lethal cases of all acute intoxications /10,21/. Although the highly toxic substances were replaced by less toxic OP pesticides and more contemporary methods of treatment had been introduced the acute OP poisonings continue to have a high lethal rate and represent one of the most serious problems of the nowadays clinical toxicology. /5,20/. Some omissions in the first medical aid also contribute to this fact. /4/.

In this relation we have put ourselves a task to study the lethality from AEI with OP in Varna region during the period 1991-2005 in order to establish the frequency of the lethal outcomes, to analyze the lethality according to sex, age, years, type of the pesticide, relative part of different pesticides in the death rate, and also the concrete reasons for the lethal exit.

MATERIAL AND METHODS

Address for correspondence:

Snezha Zlateva, Clinic of Toxicology, Military Medical Academy, Naval Hospital, Varna,
E-mail: snezha.zlateva@abv.bg

A retrospective study of the hospital case files and the forensic protocols of the autopsies of all 40 patients with lethal outcome previously treated at the Department of Toxicology, Naval Hospital-Varna.

RESULTS AND DISCUSSION

207 patients with acute OP intoxications were treated at the Department of Toxicology, Naval Hospital-Varna, during the examined period. Lethal outcome was registered in 40 cases /19.32%/. This frequency corresponds to the frequency shown in the specialized literature in many researches. /1,11,12,18,23,26/. The analysis of the lethality by years showed significant variances. In 2001 there were no lethal cases, but there were only 2 patients with OP poisonings during this year. The highest death rate was registered in 1992- 33.3 %, when 21 patients with OP intoxications were treated at the Department of Toxicology. OP poisonings were the cause of lethality in 25.24% of the total death rate from acute intoxications. In 28 lethal cases /70%/ the patient was a man and in 12 lethal cases /30%/ - a woman. The death rate of male patients was significantly higher than that of female patients- 2.33: 1. These results are due to the fact that OP AEI are more frequent in men than in women /3,5/ as well as to the fact that usually suicidal attempts in men are more grave and lead to more serious poisoning. The distribution of the patients with lethal OP poisonings according to the age showed lowest death rate in the age group of young patients / younger than 24

years/ and highest in the age group of patients over 60 years. /Table 1/

Table 1. Distribution of the lethality from OP acute intoxications according to the age group

Age group	Total number of treated OP intoxications	Lethal cases	Percentage
Under 24 years	25	1	4 %
25- 44 years old	41	3	7.32 %
45- 60 years old	72	15	20.83 %
Over 60 years	69	21	30.43 %
Total number	207	40	19.32 %

The average age of the deceased patients was 59 years. It makes an impression that with the growing of the age the death rate is increasing too. This fact can be explained with more severe clinical course of the intoxication and less adaptive potential of the elder patients, a result of existing serious co morbidity which weakens the resistive and reparative potential in the course of the OP poisoning and which can undoubtedly influence the clinical course and outcome of the poisoning.

Lethal outcome from OP poisoning with 5 different OP pesticides was registered. In one case the type of OP pesticide could not be established. /table 2/. The prevailing part of the death cases was caused by Dimethoate /Bi-58/- an OP pesticide with middle toxicity. These results are due to banishment of the highly toxic and dangerous OP pesticides as Parathion, Intrathion, etc. in Bulgaria and to the widespread use of Dimethoate in our country nowadays.

Table 2. Relative part of different OP pesticides which had led to lethal acute exogenous OP intoxication.

OP pesticide	Number of the lethal cases	Percentage
Dimethoate	33	82.5 %
Neocidol	3	7.5 %
Nurele D	1	2.5 %
Fenitrothion	1	2.5 %
Azodrin	1	2.5 %
Not identified	1	2.5 %
Total	40	100 %

All the described lethal OP poisonings took place after an oral ingestion of pesticides. 35 cases /87.5 %/ were suicidal attempts and 5 cases / - accidental household poisonings. The oral ingestion of a pesticide , especially when done with a suicidal purpose , leads to a massive entry of great quantity pesticide in human organism and consequently- to more severe clinical course of the intoxication and high death rate.

The main cause of death was development of a syndrome of multiorgan insufficiency /SMOI/.

Table 3. Causes of death in OP acute exogenous intoxications.

Cause of death	Number of lethal cases	Percentage
Syndrome of multiorgan insufficiency	33	82.5 %
Heart rhythm disorders	4	10.0 %
Intermediary syndrome	2	5.0 %
Myocardial infarction	1	2.5 %
Total	40	100 %

In practice the syndrome of multiorgan insufficiency was the cause of death in 37 cases /92.5 %/. Each of the patients who had died from immediate cause of death rhythm disorder had clinical data about SMOI as well. With the introduction into use of contemporary methods and means of re-animation and intensive treatment permitting elongation of the life or survival of the critically ill the OP poisonings lead to the development of typical symptoms of multiorgan disorders and multiorgan failure which consequently can cause the death of the patients. /2,6,9,27/. The lethality of the patients with SMOI grew from 8.3 % to 100 % with the increasing of the number of the involved organs and systems with insufficiency. /2/. In two cases the death occurred after a peripheral type of paralysis of the respiration - development of intermediary syndrome. In one case the immediate cause of death was an acute myocardial infarction in a patient with coexisting ischemic disease of the heart, on the eighth day of the intoxication, on the background of slow restoring of the cholinesterase activity.

CONCLUSION

We consider that OP acute exogenous intoxications continue to be a serious test for the doctors- toxicologists as they quite often end with lethal outcome. We establish lethality of 19.32 %. This relatively high death rate is due to the severe forms of intoxication - a result mainly of suicidal attempts with oral ingestion of great quantity of OP and high average age of the intoxicated. The death rate was higher in male patients than female. The proportion male to female patients was 2.33: 1. We report that with the growing of the age the lethality is increasing too. The main cause of lethal outcome was the development of a syndrome of multiorgan insufficiency.

REFERENCES

1. Лужников Е. А., Л. Г. Костомарова. Острые отравления, Москва, Медицина, 1989.

2. Маринов П., Т. Ташев, М. Аспарухова. Синдром на многоорганна недостатъчност при остри екзогенни интоксикации с фосфорорганични пестициди. *Спешна медицина*, т.6, 4, 1998, 42-44.
3. Маринов П., Т. Ташев, Ю. Събева и др. Епидемиологични тенденции при острите екзогенни интоксикации с фосфорорганични пестициди във Варненски регион в периода на преход към пазарно стопанство. *Хигиена и здравеопазване*, vol. XLII, 1, 1999, 3-5.
4. Маринов П., Ю. Събева, М. Аспарухова и др. Анализ на ефективността на първата медицинска помощ при остри екзогенни интоксикации с фосфорорганични пестициди в доболничния период във Варненски регион. *Хигиена и здравеопазване*, vol. XLII, 2, 1999, 8-10.
5. Маринов П. Някои аспекти на епидемиологията, токсикокинетиката, клиничното протичане, лечението и прогнозата при острите екзогенни интоксикации с фосфорорганични пестициди. Дисертация, Варна, 2002.
6. Agostini M, Bianchin A. Acute renal failure from organophosphate poisoning: a case of success with haemofiltration. *Hum Exp Toxicol* 2003; **22** (3): 165-7.
7. Asari Y., Kamijyo Y., Soma K. Changes in the hemodynamic state of patients with acute lethal organophosphate poisoning. *Vet Hum Toxicol* 2004; **46**(1): 5-9.
8. Batra AK., Keoliya AN., Jadhav GU. Poisoning: an unnatural cause of morbidity and mortality in rural India. *J Assoc Physicians India*. 2003; **51**: 955-9.
9. Betrosian A., Balla M., Kafiri G. et al. Multiple systems organ failure from organophosphate poisoning. *J Toxicol Clin Toxicol* 1995; **33**(3): 257-60.
10. Daisley H., Simmons V. Forensic analysis of acute fatal poisoning in the southern districts of Trinidad. *Vet Hum Toxicol* 1999; **41**(1): 23-25.
11. Fabritius K., Balasescu M. Acute non-occupational intoxications with pesticides in Romania: a comparative study from 1988 to 1993. *Toxicol Lett* 1996; **88**:211-4.
12. Gnyр L., Lewandowska-Stanek H. The analysis of organophosphates poisoning cases treated at the Centre for Acute Poisoning in Lublin Provincial Hospital in 1994-1996. *Przegl Lek*. 1997; **54**(10): 734-736.
13. Grmec S., Mally S., Klemen P. Glasgow Coma Scale score and QTc interval in the prognosis of organophosphate poisoning. *Acad Emerg Med*. 2004; **11**(9): 925-30.
14. Guloglu C., Kara IH. Acute poisoning cases admitted to a university hospital emergency department in Diyarbakir, Turkey. *Hum Exp Toxicol*. 2005; **24**(2): 49-54
15. Iliev Y., Akabaliev V., Doychinov I. Characteristics of adult acute poisoning mortality in a large industrial-agrarian region of Bulgaria during socio-economic transition and crisis (1990-1998). *Vet Hum Toxicol*. 2000; **42**(6): 366-9.
16. Juarez-Aragon G., Gastanon-Gonzalez JA., Peter-Morales AJ et al. Clinical and epidemiological characteristics of severe poisoning in an adult population admitted to an intensive care unit. *Gas Med Mex*. 1999; **135**(6): 669-75.
17. Lin CL., Yang CT., Pan KY. et al. Most common intoxication in nephrology ward organophosphate poisoning. *Ren Fail* 2004; **26**(4): 349-54.
18. Munidasa UA., Gawarammana IB., Kularatne SA. et al. Survival pattern in patients with acute organophosphate poisoning receiving intensive care. *J Toxicol Clin Toxicol*. 2004; **42**(4): 343-7.
19. Nagami H., Nishigaki Y., Matsushima S. et al. Hospital-based survey of pesticide poisoning in Japan, 1998-2002. *Int J Occup Environ Health*. 2005; **11**(2): 180-4.
20. Seydaoglu G., Satar S., Alparslan N. Frequency and mortality risk factors of acute adult poisoning in Adana, Turkey, 1997-2002. *Mt Sinai J Med*. 2005; **72**(6): 393-401.
21. Singh D., Tyagy S. Changing trends in acute poisoning in Chandigar zone: a 25 year autopsy experience from a tertiary care hospital in northern India. *Am J Forensic Med Pathol*. 1999; **20**(2): 203-210.
22. Srivastava A., Peshin S., Kaleekal T. et al. An epidemiological study of poisoning cases reported to the National Poisons Information Centre, All India Institute of Medical Sciences, New Delhi. *Hum Exp Toxicol* 2005; **24**(6): 279-285.
23. Sungur M., Guven M. Intensive care management of organophosphate insecticide poisoning. *Crit Care*. 2001; **5**(4): 211-5.
24. Tagwireyi D., Ball DE., Nhachi CF. Toxicoeidemiology in Zimbabwe: pesticide poisoning admissions to major hospitals. *Clin Toxicol*. 2006; **44**(1): 59-66.
25. Ulmeanu C., Nitescu Gimita VG. Mortality rate in acute poisoning in a pediatric toxicology department. *Przegl Lek*. 2005; **62**(6): 453-5.
26. Yamashita M. et al. Analysis of 1000 consecutive cases of acute poisoning in the suburb of Tokio leading to hospitalisation. *Vet Hum Toxicol*. 1996; **38**: 34-35.
27. Zivot U., Castorena JL., Garriott JC. A case of fatal ingestion of malathion. *Am J Forensic Med Pathol* 1993; **14**(1): 51-3.