

TENDENCIES OF NITRATES ACUTE INTOXICATION IN NEWBORN OF BACĂU COUNTY DURING 2000 - 2005

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Abstracts. Aim. The methemoglobinemia annual monitoring within the National Community Health Program represented the support of the descriptive epidemiologic study of the medical cases in Bacău county, in 2000-2005 period, compared to former periods of time and to other territories in North-Eastern of Romania. **Material and methods.** On a decreased incidence background in the Romanian Eastern part of the territory, Bacău county maintains an incidence level of 2.0-5.3%, with a slightly increased (and sometimes constant) tendency in the region. The total of 161 cases registered in Bacău county, in 2000 – 2005 period, represented 19.1% of the cases in North-Eastern region. **Results.** With descriptive aspects regularly met in cases of methemoglobinemia regarding gender, age, child's nutrition, over half of them were produced due to exposure to nitrates quantity in water over 101 mg/dm determined by inadequate hygienic conditions of the fountains. **Conclusions.** The territorial distribution of the cases outlines the areas by risk of the county, indicating, at the same time, the measures of the primary prophylaxis that must be taken.

Key words: child methemoglobinemia, water quality in the rural environment, descriptive epidemiologic study

Rezumat. Scop. Monitorizarea anuală a metemoglobinemiei în cadrul Programului Național de Sănătate Comunitară a reprezentat suportul studiului epidemiologic descriptiv al cazurilor în județul Bacău, pentru perioada 2000-2005, comparativ cu perioadele anterioare și cu alte teritorii din regiunea de Nord-Est a Moldovei (România). **Material și metode.** Pe fondul tendinței de scădere a incidenței în zona de est a României, județul Bacău menține un nivel al incidenței între 2.0-5.3%, cu ușoară tendință de creștere și cvasiconstant peste nivelul din regiunea de Nord-Est a Moldovei. Cele 161 de cazuri înregistrate în perioada 2000-2005 în județul Bacău reprezintă 19.1% din cazurile din Moldova. **Rezultate.** Cu aspecte descriptive obișnuit întâlnite la cazurile de metemoglobinemie privind sexul, vârsta, alimentația copilului, peste jumătate s-au produs la expuneri la cantități de nitrați în apă de peste 101 mg/dm³ determinate de condițiile necorespunzătoare igienic ale fântânii. **Concluzii.** Distribuția teritorială a cazurilor conturează zonele cu risc ale județului spre care trebuie orientate cu precădere măsurile de profilaxie primară.

Cuvinte cheie: metemoglobinemie la copil, calitatea apei de băut în mediul rural, studiu epidemiologic descriptiv

INTRODUCTION

The rural zone of Bacău county is characterized by frequent nitrous substances pollution of drinkable water, representing – by the high number and

the intensity of the pollutions – an increased risk in territory.

Thus, between 1984-1995, Bacău county joins among the Romanian territory within the 50–75% out of the

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increased nitrates concentration fountains, with a level which surpassed three times over the maximum CMA in about 9% of the situations (1).

At the same time, for a long period of time, Bacău county has characterized itself by an increased tendency of number of acute methemoglobinemia cases among newborn babies, so the county places between the Romanian territories with an incidence of 1–5 % (2). From the first description of an acute intoxication with nitrates at a baby, made by Comly in 1945, there have been a lot of clinic and epidemiologic proofs (our country included) concerning nitrous substances contamination of water and food, and the acute and chronic effects on health (3).

Over the Nord-Eastern region of Romania, annual pursue of acute methemoglobinemia cases being part of the activity of Health Ministry – National Communitary Health Program, and as epidemiologic investigations concerning the long period effects of consuming contaminated nitrous substances water, it has been proved that in Bacău county there already existed characteristic features, and by knowing them they can constitute the support of some prevention and control measures in the territory (4, 5, 6).

These elements constituted the foundation of making a descriptive epidemiologic study of acute methemoglobinemia in newborn babies, in Bacău county, between 2000 – 2005, compared to former periods of time and to some other Moldavian territories.

MATERIALS AND METHODS

This study used as statistic unity the “hospitalized case” with certain diagnosis of acute nitrates intoxication, in 2000-2005 (7, 8).

Investigation sheet of the case – unitary at national level – includes:

- identification data of the hospitalized patient: age, gender, place of residence;
- data concerning the disease: diagnosis, evolution, treatment;
- exposure data: chemical and bacteriological quality of drinkable water consumed by the child, before the intoxication took place,

The results were processed by:

- the annual incidence rate per 1000 children, 0-1 year old, living in the patient’s place of residence;
- tendency;
- using statistic meaning indicators of frequency differences between various territories or periods - χ^2 .

RESULTS AND DISCUSSIONS

Between 2000-2005, in 8 counties from Eastern Romania, there have been registered 844 cases of acute methemoglobinemia, 19.1‰ in Bacău county. This figure creates an annual incidence average rate on Nord-Eastern region of Romania of 2.68% with territorial variations from 0.58‰ (Suceava county) to 5‰ (Botoșani county), and annual from 1.76 in 2004, to 3.45‰ in 2000.

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Table 1. Number of annual cases and the annual incidence rate of methemoglobinemia cases of 0-1-year aged infants in Eastern Romania for the 2000-2005 period

COUNTY	2000	2001	2002	2003	2004	2005	Total number of cases	Annual incidence rate
Bacău	43	37	17	17	16	31	161	3.69
Botoșani	39	47	17	31	16	21	171	5.00
Galați	12	19	5	5	3	8	52	1.43
Iași	82	46	36	34	44	42	284	4.70
Neamț	8	3	8	4	17	7	47	1.41
Suceava	-	3	14	8	-	4	29	0.58
Vaslui	18	6	24	7	7	14	76	2.17
Vrancea	10	5	3	4	1	1	24	1.07
Total cases	212	166	124	110	104	128	844	
p. 1000	3.46	2.70	2.07	2.10	1.76	2.41		2.68

Number of cases from Bacău county represents:

Year	%
2000	25.9
2001	29.8
2002	13.7
2003	15.5
2004	15.4
2005	24.2

Out of the total number of Nord-Eastern region of Romania cases, in the same interval, the “contribution” of the county territories to the whole

number of Nord-Eastern region of Romania cases situated between 3% (Vrancea and Suceava) and 34% (Iași) (fig. 1).

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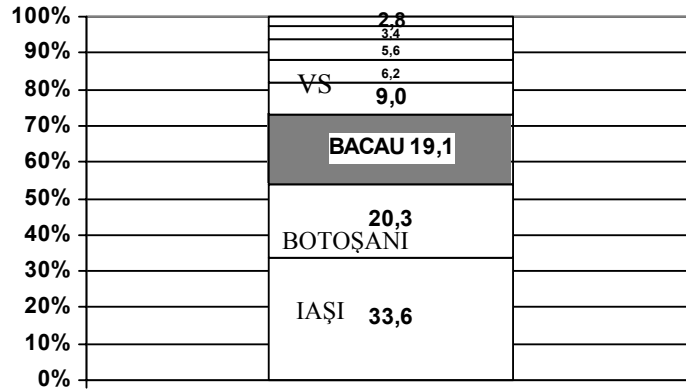


Fig. 1. Proportion of methemoglobinemia cases on counties between 2000-2005 (1000 out of the total number in Nord-Eastern region of Romania)

Evolution of the cases meets 2 distinct stages: between 1996 – 2000 where there has been an increased tendency,

and in the last 6 years where there has been a decreased tendency (fig. 2).

$$y=148.2+13.6x$$

$$y=202.67-17.71x$$

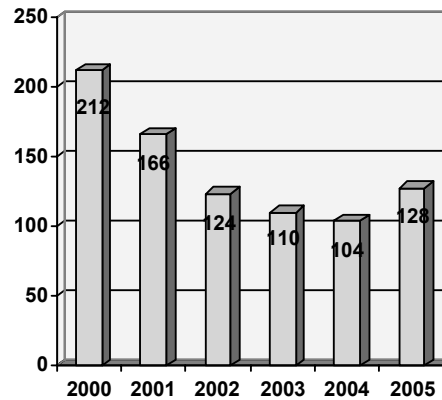
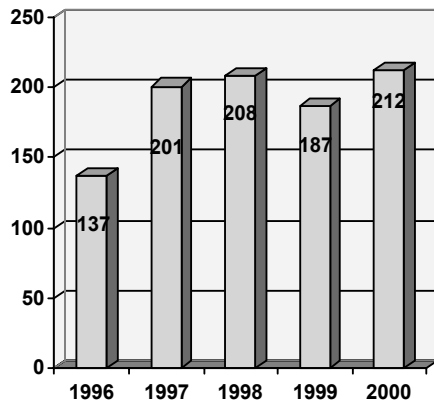


Fig. 2. The trend of methemoglobinemia cases in Nord-Eastern region of Romania during 2000-2005, compared to 1996 – 2000 period

For the entire period of this last decade on the Moldavia territory the decreased trend of the case number is

mentioned and Bacău county is included in this trend (fig. 3).

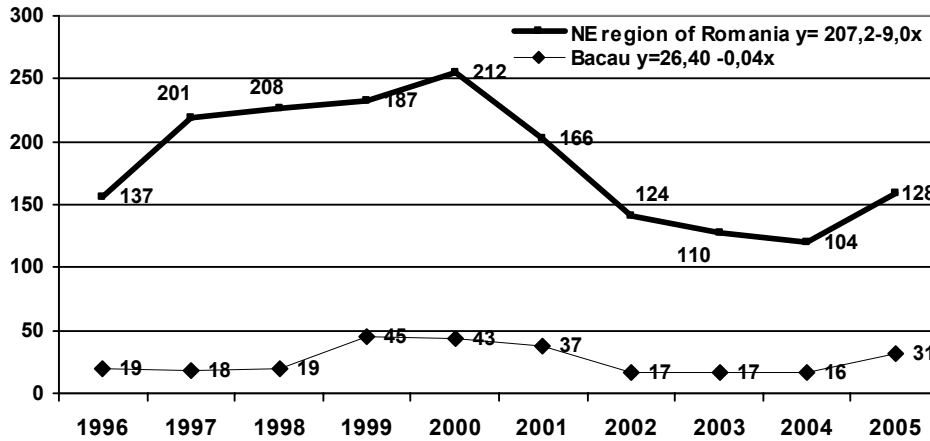


Fig. 3. The trend of methemoglobinemia cases between 1996 and 2005 period in Nord-Eastern region of Romania and Bacău county

For the same period of time, the incidence level keeps the decrease trend for the Moldavia territory, but

with a slight increase for Bacău county (fig.4).

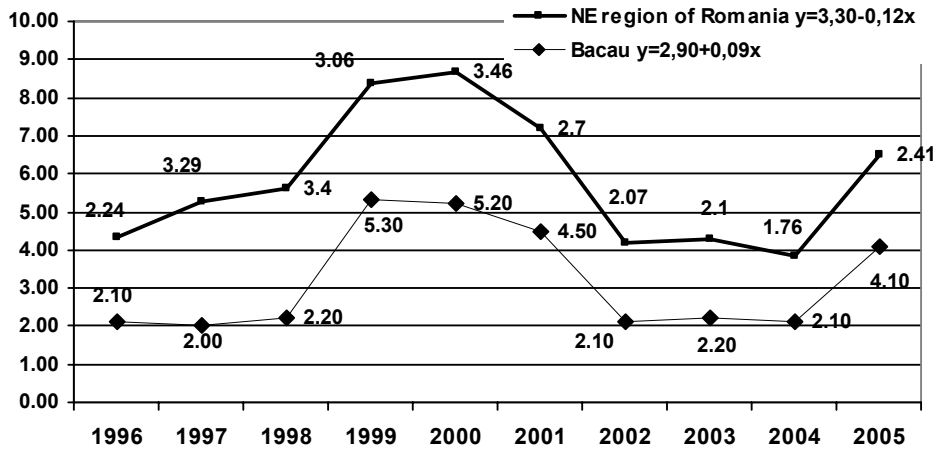


Fig. 4. The trend of methemoglobinemia incidence in Nord-Eastern region of Romania and Bacău county 1996 – 2005 period

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Comparing the annual incidence on counties, we observe that starting with 1999, in every transversal shot, Bacău county has an incidence level over the average of Moldavia, thus confirming

the hierarchy of Moldavian territories, pointed out by some other former studies. Figure 5 reveals the situation in 1999, 2005 and for the total period in 1999, 2005 and for the total period (fig. 5).

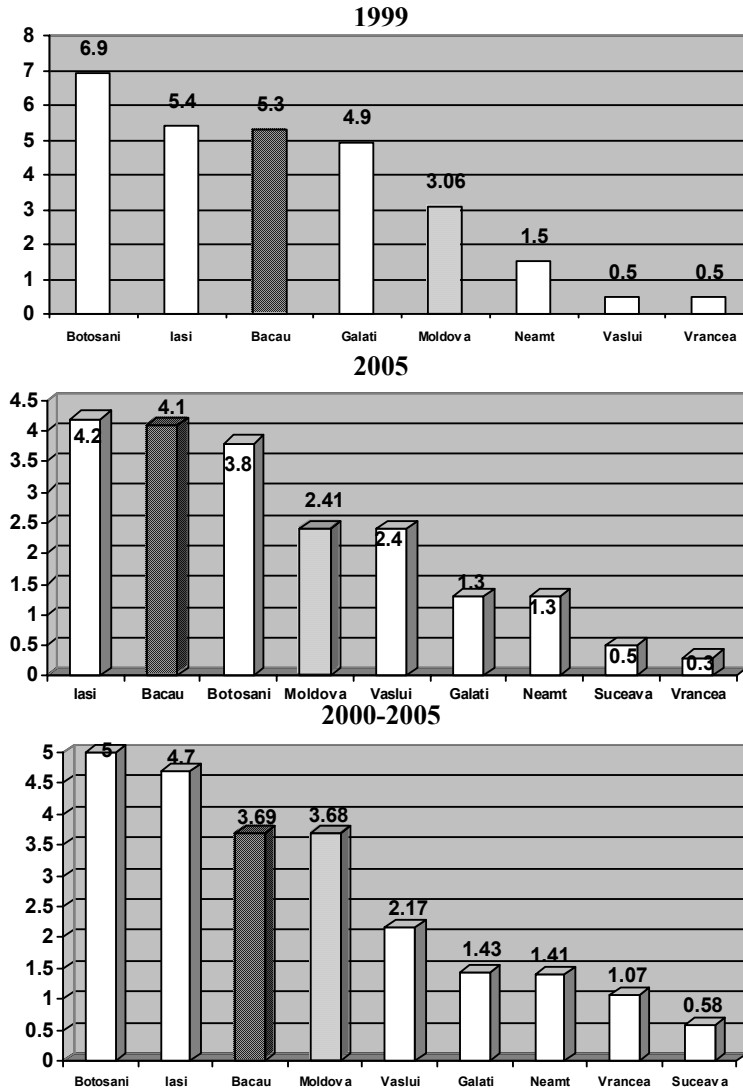


Fig. 5. Distribution of the counties after annual incidence compared to Nord-Eastern region of Romania in the year 1999 and the year 2005 and in 2000 – 2005 period

In detail, descriptive analyses in Bacău county between 2000 and 2005 years registered 161 cases in 45 rural areas (over 65% in county localities) and Bacău and Onesti cities. In 6 years of this study it were produce a number of 1-2 cases (in 26 rural localities and 4 urban places) till 12 cases (Plopana). These dates determined mean annual rates of incidence between 0.51‰ in Bacău city, 1,64‰ in Gîrleni locality and 72.72‰ in Plopana locality.

We added chronologic and geographic criteries some personal aspects of cases:

- the equal percentage of diagnosed cases in all 4 quarters;
- around 9 at 10 cases were registered at age group less 3 months (fig.6);
- more than half of cases were boys;
- more than three fourths of infants were formula or breast and formula feeding (fig. 7);

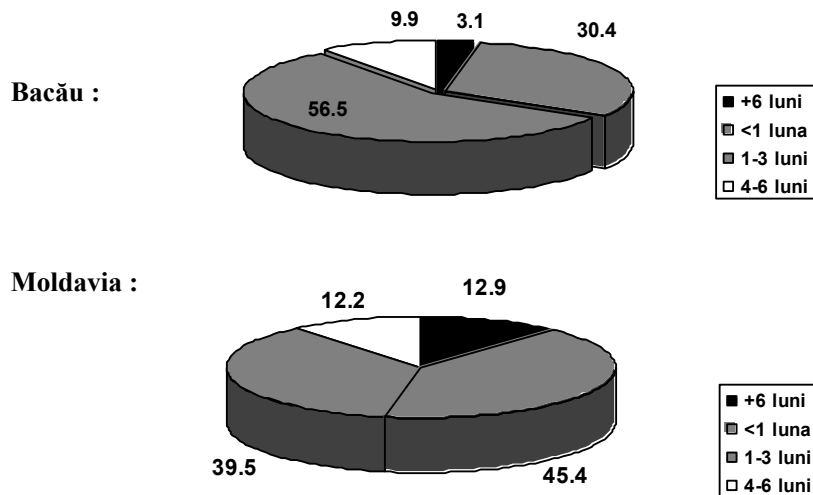


Fig. 6: Age distribution of methemoglobinemia cases during 2000 – 2005 in Bacău county and Nord-Eastern region of Romania

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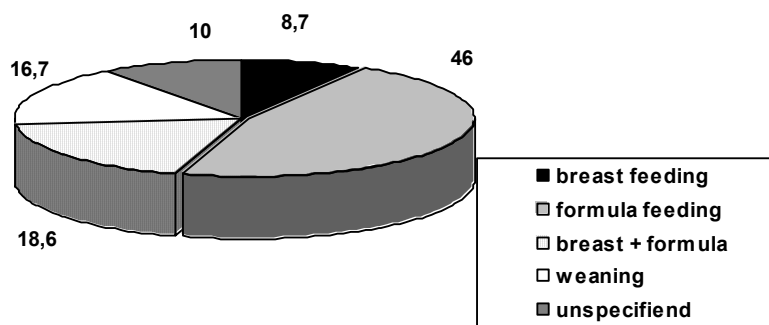


Fig. 7: The type feeding frequencies

- in 7/10 cases there has been a slight evolution of healing, in the same period, in Moldavia there have been several cases with severe forms and 3 deaths (0.4%);

The causality in relationship to water nitrates has been distinguished by some characteristic features of supplying with drinkable water.

		BACĂU	Nord-Eastern region of Romania
Clinic form	easy	75,2%	46,9
	average	9,3	25,4
	severe	15,5	27,1
	deaths		0,35
ASOCIATION with Acute Diarrheic Disease		30,4	30,8
ASOCIATION with respiratory disease		9,3	6,5%

- in 57,1% of the cases there were low depth public fountains, below 10 meters (56,4%); 19,9% were situated near the latrines and 44,1 have no elementary measures of sanitary protection.

The situation is even more unfavorable compared to other Moldavian territories, with just 30% out of sanitary unprotected fountains. The nitrates quantity in the water at the moment the child falls ill is presented in table 2.

Table 2. Distribution of methemoglobinemia cases on nitrates levels in well water samples in Bacău county, compared to Nord-Eastern region of Romania

NO3 MG/L \ CASES %	BACĂU	Nord-Eastern region of Romania
< 50	23.0	13.5
51-100	26.1	27.7
101-500	48.5	54.9
over 500	2.5	3.8

From this point of view, the situation in Bacău is more favorable compared to the rest of Moldavia territory, the difference being obvious from the statistic point of view ($\chi^2=8,07$, GL = 3, $p<0,05$.)

Depending on the hierarchic criteria of the established territories through

national level studies (2) and for the Moldavian territories (5) we mention the improvement tendency of the situation in the Moldavian counties, which nevertheless remain areas with risk, characterized by methemoglobinemia incidence of 1 – 5% (table 3).

Table 3. Distribution of Nord-Eastern region of Romania counties on methemoglobinemia cases in three different periods

	1991-1993*	1996-2000**	2000-2005
Areas without information (F)	Suceava, Neamț	Suceava	-
Areas without risk (E)	-	-	-
Areas with incidence rate <1‰ (D)	Vrancea	Vaslui	Suceava
Areas with incidence rate 1-5‰ (C)	Bacău , Vaslui, Galați	Bacău , Neamț, Galați, Vrancea	Bacău, Botoșani, Galați, Iași, Vaslui, Vrancea, Neamț
Areas with incidence rate 6-10‰ (B)	Iași	Iași, Botoșani	
Areas with incidence rate +10‰ (A)	Botoșani	-	

Data source: * Tanase Irina - ISP Bucuresti; ** Vasilov Marieta – ISP Iași

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CONCLUSIONS

- Acute methemoglobinemia of the newborn babies represents the direct and dramatic effect of exposure to nitrates contamination of the drinkable water.
- On a background of a decreasing trend of a number of cases and of the incidence in the last 10 years in Nord-Eastern region of Romania, Bacău county maintains a slightly increasing tendency of the incidence and it situates itself in an almost constant manner over the annual rate of the Nord-Eastern region of Romania incidence.
- Although, generally speaking, it manifests in easy forms and has a favorable evolution, towards clinical healing, acute methemoglobinemia of the newborn babies represents Nord-Eastern region of Romania mostly, and particularly in Bacău county, closely linked to the environment factor – drinkable water – which has an inadequate quality in the rural areas.
- The performed study indicated the increased risk areas in the county, so there must be carried out primary prevention measures.

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