

CORRELATIONS BETWEEN HEAVY METAL POLLUTION AND GENERAL MORBIDITY OF THE APUSENI MOUNTAINS AREA

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ABSTRACT. An individual character of the Apuseni Mountains area is the presence of numerous mining activities. Historians marked this place first in the year 100. Archaeologists and various specialized studies have shown a history of heavy metal pollution in the Golden Quadrilateral (an area of approximately 5002 km framed between localities Săcărâmb, Caracal, Zlatna and Baia de Aries). There have been numerous studies that have shown significant contaminations of heavy metals in ground-water, air and soil. For example, for PM 10 was revealed statistically significant positive correlation with chronic bronchitis, asthma, for PM 10 it was statistically revealed a significant and positive correlation with chronic bronchitis and asthma; for lead in water was found a positive correlation with hypertension, anemia, but it was statistically insignificant; for arsenic, cadmium, mercury there had been found statistically significant correlations with cardiovascular diseases. The Public Health Department from Alba has a statistical inventory on cancer with registers from 2008 to 2011 that has been used in this study, relating an approximate rating in the cancer number and type from Alba County.

Key words: *heavy metals, pollution, morbidity, mining*

INTRODUCTION

An individual character of the Apuseni Mountains area is the presence of numerous mining activities. Historians marked this place first in the year 100. Archaeologists and various specialized studies have shown a history of heavy metal pollution in the Golden Quadrilateral (an area of approximately 500² km framed between localities Săcărâmb, Caracal, Zlatna and Baia de Aries). There have been numerous studies that have shown significant contaminations of heavy metals in ground-water, air and soil.

Current data shows that in Rosia Montana, demographic structure has changed: by displacement of approx. 25% of population (mostly young adults), the average age of the population increased, birth rate and average lifespan are below national averages and while mortality values are above these benchmarks.

In a study made in 2007 in the area, based on questionnaires regarding heavy metal exposure (Impact on health of Rosia Montana, 2007), the conclusions were that once again there is an increased vulnerability of the population, primarily due to an ongoing historical pollution, driven by old mines, their waste dumps and tailing dams and the activities carried out under these conditions (for example local transport issues through which dust containing heavy metals, etc.) Specific morbidity indicators related to heavy metals in the environment have shown the existence of some correlations between them. For example, for PM 10 it was statistically revealed a significant and positive correlation with chronic bronchitis and asthma; for lead in water was found a positive correlation with hypertension, anemia, but it was statistically insignificant; for arsenic, cadmium, mercury there had been found statistically significant correlations with cardiovascular diseases etc. (Respect baseline study of water quality, 2007).

In the last 5 years, the overall morbidity in Alba County had an increase of 19% (DSP Alba, 2012), and in the same time, tumor diseases (lead to some forms of cancer) had increased by 145% in the central region of the County. Knowing the main clinical manifestations and carcinogenic action of heavy metals on the human body, this study aims to find out if there is a general trend of the development of such diseases or a particular case generated by the heavy metal pollution of the site, following a national trend.

METHODOLOGY

Statistics was used for the interpretation of morbidity indicators from Campeni, Abrud Zlatna for the last 5 years and then compared to the environmental data (soil, water, air) regarding heavy metal contamination from the Apuseni Mountains. The disadvantage of this method is that statistics is limited to a certain number of reporters, lack of geographical morbidity county records.

The result of this method is a comparative analysis of ontological diseases from Alba County between year 2008 and 2011 (Table 1).

RESULTS

Cancer is the second leading cause of death in Romania, after cardiovascular disease. Still, Romania is lacking a nationwide statistics regarding this disease. In 2002 the PHARE project RO 2002/000-586.04.11.03 launched the National Cancer Registry aiming to collect data on the cancer epidemiology over several years. Some statistic data had been extracted from the last report and used in this study. In 2008, new cancers were reported on county level, from the center of Romania, as follows: 4297 new cases in Alba (29.53%), 27.67% in Sibiu, 20.69% in Covasna, 59% in Brasov 10.59%, 8 31% in Mures and 3.21% in Harghita. Alba clearly stands out as the leader closely followed by Sibiu.

New cases of cancer reported in the central region of Romania prevalent in age groups 55-59 years (642 cases), 60-64 years (573 cases), 50-54 years (541 cases) and 70-74 years (492 cases). After locating the tumor the most common are: breast tumor cases 708 (16.47%), cervix cases, 487 (11.33%), colorectal cases, 468 (10.89%), lung, cases 454 (10.56%), malignant melanoma in 199 cases (4.63%), stomach in 182 cases (4.23%), prostate in 179 cases (4.16%), uterus in 169 cases (3.93%) and ovary in 16 cases (2.69%).

The Public Health Department from Alba has a statistical inventory on cancer with registers from 2088 to 2011. The results are shown in Table 1, and are divided into the major cities of Alba County.

Table 1. Total reports for the years 2008 -2011 oncological diseases

ORASE	2008	2009	2010	2011
Abrud	7	17	17	35
Aiud	73	61	74	50
Alba	134	199	239	366
Blaj	83	69	123	94
Cugir	3	44	54	70
Campeni	N/A	8	15	70
Sebes	N/A	90	88	177
Ocna M	N/A	61	49	28
Zlatna	7	19	22	36
TOTAL		568	681	926

It can be observed a growth of over 100% in cities like Abrud, Cimpeni, Cugir, Sebes and Alba (Szabó, 2009; Baur et al., 1997). In each major city, changes are observed from one year to another (Table 1).

Since 2008 in Abrud had been reported 7 cancer cases, in 2009 lung and cervical cancers have increased. In 2011 there had been reported other cancer cases like stomach, colon, rectum, urinary or pelvis.

In Campeni, there is data only from 2008, with 8 cases of breast cancer. In 2011 there all kinds of cancer cases, stomach, liver mostly lung cases.

Reports from 2008 show that most cancer cases from Zlatna are again breast cancers (Annual report, 2008), followed by lung. In 2011 they vary al lot more, and also there are new cancers, unreported before: leukemia, brain, in situ melanomas and kidney.

A detailed analysis o shows that, besides the increasing number of cases from year to year, in 2011, there are 11 cases of leukemia. The question is what favors the appearance of this cancer?

CONCLUSIONS

This paper represents the beginning of a puzzle, which after several years of study and analysis, will offer a detailed image on the relationship between historical heavy metal polluted areas and the reflection of their evolution on the cancers types.

From the data presented in this paper, there is an increase in the number of cancer cases but there could have been errors in the numbering, based on the undiagnosed cases or the unreported ones. However, there are signs of similarities in the evolution of lung, stomach, liver over the years that may be associated to the heavy metal contamination of the analyzed area. An objective analysis can be developed after several years of cancer monitoring from the region but also of the environmental factors-heavy metal pollution.

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