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THE ASSESSMENT OF RADIOACTIVE POLLUTION IN THE OCCURRENCE OF STRUCTURAL DENTAL ABNORMALITIES

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Abstract

The etiopathogeny of the structural dental anomalies is multiple, genetic, endocrinological, and also environmental factors are acting. In the past 50 years natural radioactivity in the region Stei, Bihor county, shows significant changes due to human activity. Although the specific activity of uranium is small, the potential for contamination is high because large amounts of ore have been extracted and processed, in the same time appearing large amounts of radioactive wastes. The purpose of this paper is to highlight the assessment of environmental factors on structural dental anomalies, to study the prevalence of these anomalies and to make a comparative study between three areas of Bihor county, considered to have varying degrees of radioactive pollution: the uraniferous zone Stei, Beius and Oradea.

Key words: radioactive pollution, structural dental anomalies.

INTRODUCTION

The activity of exploration, exploiting and processing of uranium ores appeared in Bihor county in 1949.

The research work was started in 1950, when the ore at Baita become one of the greatest uranium mining exploitation in the world at that time, 1950 to 1960 (Porumb A., 2008).

The quality of the ore, the industrial reserve, the location (proximity to surface), has favored the development of the mining activity in the region in an unprecedented rate. This triggered harmful effects concerning the environmental pollution. For the moment, the activity had a positive social impact for the area, materialized mainly by the appearance of the cities Ștei and Nucet, and in the hamlets Baita village and in Baita-Plai were built colonies for the workers and soldiers. The income of the inhabitants grew rapidly and, as such the standard of living and civilization in the area (Rojanschi V., Bran F., 2002, Porumb A. et al, 2012).

At the uraniferous mining exploitation, the contamination was possible both to occupationally exposed workers, to the population in areas

with mining activity and also to the environment. Contamination was possible through all the elements of the uranium family (Porumb A., 2014).

Due to the radioactive, physicochemical and biological characteristics of some of those elements, as well as due to their mode of dispersal and to environmental factors, the main radio-nuclides responsible for the production of contamination were natural uranium, radium 226 and radon 222 (Cernea V., 2003).

Exposure to nuclear radiation: It is recognized that radioactive ore extraction and processing are works with high potential for environmental pollution and at the same time generating additional risks for occupationally exposed workers that are working in a radioactive environment (Mates I.D, 2009; Sevbitov A.V.et al, 1999).

Rainfall waters that washed the quarry, including the ore were discharged directly into the ground from the area, fragments of ore also being driven. Many residents have built houses using as construction rock tailings from the mine. The waste dumps are spread over the area of approx. 50 ha (Dănoiu D., Dumescu F., 2010).

Natural radioactivity, a basic component of the environment is determined by the presence in the soil, air, water, vegetation, animal organisms as well as in humans of the radioactive substances of terrestrial origin, existing naturally sice ancient times. In the past 50 years, natural radioactivity in the area shows significant changes due to human activity. (Mates I.D, 2009).

The importance in environmental pollution by radioactive elements from the uranium series is different according to the environmental factor considered (Edelstein M. , Makofake W., 2007, William V. et al., 2006). The most affected environmental factor is water.

MATERIAL AND METHOD

To evaluate the influence of the environmental factor on structural dental abnormalities we intended to study the incidence of these anomalies in three areas of Bihor county, considered to have varying degrees of radioactive pollution: the uraniferous zone Stei, Beius and Oradea.

The children examination was done in school cabinets, with the tools from the dental consultations kit. For every child was drawn up a dental observation document.

The obtained data were statistically processed by categories of geographical area, age and sex, groups of teeth (incisivo-canines and premolars) and maxillary (upper or lower, unilateral or bilateral).

RESULTS AND DISSCUSIONS

Structure disorders had a significantly higher prevalence in the area Stei than in the areas Beius and Oradea (table 1):

Table 1

The prevalence of structural disorders according to gender

Area	Total		Girls		Boys		p
	Nr.	%	Nr.	%	Nr.	%	
Ştei	65	10,94	31	10,69	34	11,18	0,876
Beiuş	17	3,61	7	3,02	10	4,18	0,119
Oradea	30	4,93	14	4,52	16	5,37	0,093
Total	112	6,69	52	6,25	60	7,13	0,152

The prevalence of structural disorders was unsignificantly higher in boys than in girls (p = 0.152). Regardless of the area, the prevalence of the structural disorders was slightly higher in boys than in girls (p = 0.876, p = 0.119, respectively p = 0.093) (fig 1):

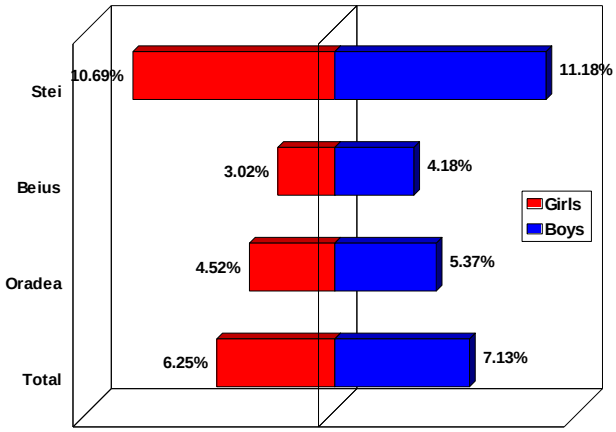

Fig.1: The prevalence of structural disorders according to gender

The percentage of dystrophies varied according to the groups of teeth examined, meaning the incisivo-canine, premolar or molar (fig. 2):

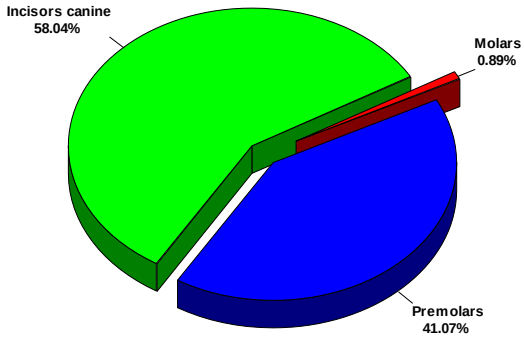

Fig. 2: The percentage of dystrophies according to the groups of teeth

In the frontal area, the percentage of dystrophies also differs depending on the examined jaw: upper or lower (fig. 3):

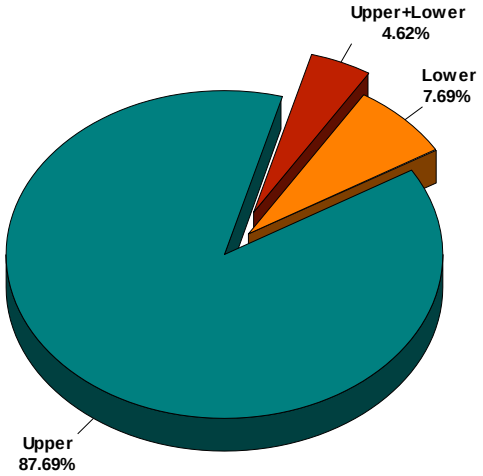

Fig. 3: The percentage of dystrophies in the frontal area of the two jaws

In the premolar area, the percentage of dystrophies is different for the two jaws, upper and lower, unilateral or bilateral (fig. 4):

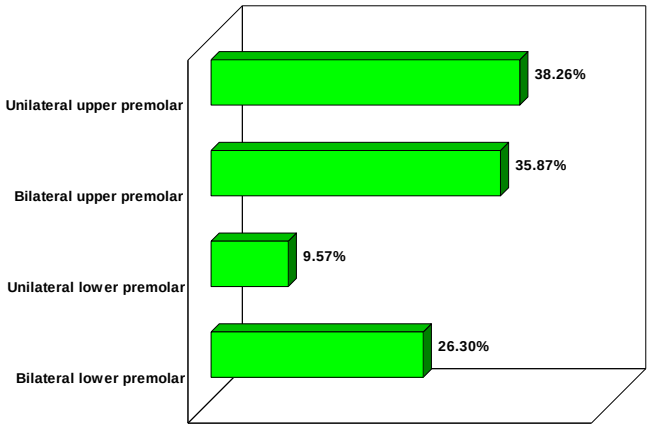

Fig. 4: The percentage of dystrophies in the premolar area of the two jaws

Besides structural dental anomalies in the irradiated area Stei, studies have shown that the incidence of bronchopulmonary cancers is 4.5 times higher than the average from other areas and that the number of congenital heart malformations is also greater in this area compared to the average from other geographical areas of Bihor county (Porumb M. et al, 2004).

Also, miners retirement is made after only 15 years of underground activity, both due to occupational diseases, specific to any mining activities (silicosis, so-called "vibration disease" etc.) and, of course, of radon 226 emissions, these affecting the health state of the miners. At that time, it is mentioned the large number of patients with silicosis or deceased in the following years.

Referring to dental anomalies, their prevalence encountered in irradiated area Stei is higher than that encountered in other studies in the literature (Olivera O. et al., 2001; Backman B., Wahlin Y.B., 2001; Pop V, 2001; Tarmure V., 2006).

CONCLUSIONS

In the irradiated area Stei there are a lot of serious health problems, beginning from the vibration disease, silicosis, congenital heart malformations or bronchopulmonary cancers.

Structural dental anomalies are one of them.

They are presented both at frontal and lateral teeth, upper and lower, unilateral or bilateral, too. The high percentage of dystrophies of the uraniferous area Ştei, much larger than the control group, could be explained by the existence of the polluting factors in the area, confirming the favorable effect of environmental factors in causing these abnormalities.

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