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*Occurrence of non-carious enamelopathies in the children
living in the vicinity of the Coal Mine Bogdanka*

Enamelopathies of permanent teeth are pluricausal problems. The etiologic factors of enamelopathies may generally be divided into exo- and endogenous ones. There are also reports of idiopathic lesions of this kind in the enamel of permanent teeth, in which neither dental history nor biochemical investigations led to distinguishing a causal factor. The clinical picture is non-specific to the extent that even an experienced clinician is sometimes unable to explicitly define the reasons why enamel changes have appeared (4, 5).

The aim of the study was to determine the incidence of enamelopathies in permanent teeth of the children living in the vicinity of the coal mine KWK Bogdanka.

MATERIAL AND METHODS

The study included 273 children, aged 7–14, living in the area adjoining the coal mine Bogdanka (Group I). The control group included 188 children from the same age group living in the areas free of industrial pollution (Group II). The clinical examination was conducted with the use of a dental mirror and probe at a dentist's surgery. The children in whom enamelopathies were detected were additionally asked to answer a short questionnaire aiming to estimate the occurrence and level of discomfort caused by this anomaly.

The obtained results were analysed statistically by means of Statistica 5.1 pl. programme. Statistical significance was established at $p < 0.05$.

RESULTS

The clinical examination revealed discoloration and hypoplastic lesions in enamel structure of 62 children from Group I (22.71%) and in 9 children from control Group II (4.79%). Located mainly on the labial surfaces of maxillary incisors and canines, the lesions were evidently limited, chalkwhite or yellowish in colour, not symmetrical, and uncomplicated with caries. There were a few cases with anomalies detected on the labial surfaces of mandibular teeth (Photographs 1, 2, 3). The children in whom abnormalities in enamel structure were revealed did not report any subjective discomfort. The more frequent incidence of lesions in boys than in girls in both Group I and Group II was not statistically significant ($p > 0.1$). Yet, a very significant dependence was found with regard to the children's residence ($p < 0.001$). A short questionnaire included questions concerning permanent residence, reporting the problem to a dentist, any experienced discomfort, and willingness to change tooth appearance.



Phot. 1. Chalkwhite spots on enamel in central maxillary incisors



Phot. 2. Yellowish spots on enamel in central maxillary incisors



Phot. 3. Enamelopathy in mandibular incisors

The majority of children with enamelopathies (50 children, i.e. 81%) have lived since birth in the areas directly bordering KWK Bogdanka (Fig. 1). Only 20 children were consulted by a dentist, which accounts for just 32% of these with lesions (Fig. 2). The boys reported discomfort connected with discoloration of enamel almost three times more often than the girls – 13 boys, 5 girls. They also reported a willingness to change the appearance of their teeth twice more frequently than the girls – 30 boys, 15 girls (Fig. 3).

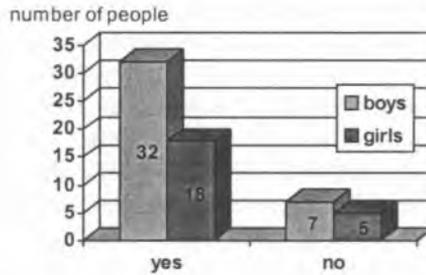


Fig. 1. Were you born in the vicinity of the coal mine Bogdanka?

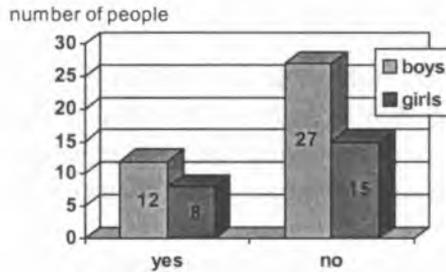


Fig. 2. Did you consult this problem with your dentist?

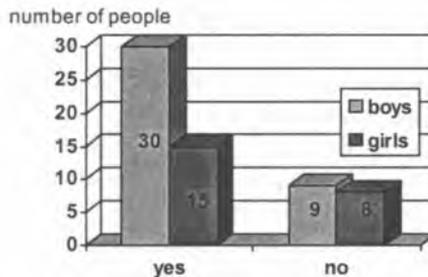


Fig. 3. Do you wish to change the appearance of your teeth?

DISCUSSION

Enamelopathies are among the most common malformations of hard dental tissues. It is now believed that there are many factors which trigger the occurrence of enamelopathies, such as: genetic factors, insufficient diets, metabolic diseases, hormonal disorders, course of pregnancy, and environmental factors of different kinds. However, their etiology is not yet fully explained (1–4, 6). The occurrence of incisor enamelopathies may often be associated with the occurrence of similar anomalies in the enamel of first molars, which brought about isolating a new disease syndrome called Molar Incisor Hypomineralisation (MIH) (7).

An analysis of enamel abnormalities in all the studied population revealed the occurrence of white and yellowish spots. They were significantly more common on the teeth of children from the areas influenced by the operation of coal industry (22.71%) than in those living in regions which were free from environmental pollution (4.79%), and the differences were statistically significant. Enamelopathies appeared twice more often in children living the closest to the mining plant. The concentration of fluoride in drinking water in this area is negligible, deep water intakes are fairly remote from the mine, and there was no emission of fluorine compounds into the atmosphere. Barańska-Gachowska found a greater incidence of fluorosis in children from regions with a higher than normal air concentration of fluorine ($11.7 \mu\text{g m}^{-3}$; acceptable value: $1.6 \mu\text{g m}^{-3}$) than in children from regions where fluorine concentration was optimal (4). Sikorska and Mielnik-Błaszczak, in their studies of enamelopathies in first-grade secondary-school students from Lublin, did not observe any dependence of the occurrence of enamelopathies on sex, course of pregnancy, or duration of pregnancy (6). The present study did not reveal any such dependence, either.

The more frequent incidence of enamel clouding in industrial areas may also be attributed to a very high incidence of airway infections in the residents of those areas, which is often connected with ventilation through the mouth, and significant amounts of drugs taken to treat those infections.

CONCLUSIONS

1. High incidence of enamelopathies in children living in the vicinity of the coal mine KWK Bogdanka may indicate a relationship between the appearance of those anomalies with the exploitation and storage of minerals.

2. Tooth aesthetics disturbances caused by enamelopathies are a source of discomfort for the patient.

3. Children from regions threatened by the operation of a plant emitting industrial pollutions should be included in continuous dental care programmes.

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SUMMARY

The main aim of this study was to examine the incidence of enamelopathies among children from the Bogdanka region. Altogether, there were examined 273 people (aged 7–14) who live in the neighbourhood of the mainfield (group I). The controlled group consisted of 188 children of the same age who lived in the areas free of chemical pollution (group II). The appearing of distempers in the structure of the enamel was marked among 62 people, the majority of whom were the boys (39), girls – 23. When it comes to the placement of these changes, they were mostly located in the labial surface of incisors of the maxilla, less frequently in the canines and premolar teeth. On the other hand, just particular changes were spotted in the mandibula. The changes mentioned above were characterized by the white turbidity, were well-limited and did not show the symmetry. In none of the cases the decay appeared as an additional factor. The clinical researches were enriched by the survey research aiming to estimate the existence and the level of discomfort among children suffering from enamelopathies.

Problem występowania zmian mineralizacyjnych twardych tkanek zębów pochodzenia niepróchnicowego u dzieci zamieszkujących w rejonie działalności KWK Bogdanka

Celem pracy było zbadanie częstości występowania zmian mineralizacyjnych w szkliwie zębów stałych dzieci z rejonu kopalni Bogdanka. Ogółem przebadano 273 osoby w wieku od 7 do 14 lat, zamieszkujące na terenie sąsiadującym z kopalnią (grupa I). Grupę kontrolną stanowiło 188 dzieci w tym samym wieku z terenów wolnych od skażeń przemysłowych (grupa II). Występowanie zaburzeń w budowie szkliwa stwierdzono u 62 osób, z czego częściej u chłopców (39 osób) niż u dziewcząt (23 osoby). Jeśli chodzi o lokalizację, zmiany najczęściej były umiejscowione na powierzchniach wargowych zębów siecznych szczęki, rzadziej kłów i zębów przedtrzonowych. Stwierdzono pojedyncze przypadki zmian mineralizacyjnych w zębach żuchwy. Zmiany w obrębie twardych tkanek zębów miały charakter zmętnienia o kredowobiałym zabarwieniu, były dobrze ograniczone i nie wykazywały symetrii. W żadnym z przypadków zmiany nie były powikłane próchnicą. Badania kliniczne wzbogacono badaniem ankietowym, mającym ocenić występowanie i poziom dyskomfortu u dzieci, u których występowały zmiany mineralizacyjne.