

Research Article

# The Prevalence of Caries of First Molars and Its Role in the Occurrence of Occlusal Disorders

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## Abstract

To study the caries lesion of the first molars we used the results of our research about the prevalence of tooth decay in young people, who live in the districts with low level of fluoride. 300 students of first 3 years of study at Ivano-Frankivsk National Medical University at the age of 17 to 20 were examined for the research of prevalence of tooth decay. They were the citizens of Ivano-Frankivsk city, Nadvirna district, Verhovyna district and Rivne region. Clinical examination included medical history and oral cavity examination with the help of dental probe and detection device diagnodent (Kavo). We found that, regardless of the place of residence, the prevalence of acute and chronic tooth decay of the first molars was the highest. Occlusal decay was observed most commonly (38.3%). The established regularities of the prevalence of caries lesions in the first molars point to the necessity of development and realization of treatment measures for the prevention of occlusal disorders.

## Keywords

caries (tooth decay); first molars; occlusal disorders

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## Problem statement and analysis of the latest research

Caries is one of the reasons of occlusal disorders and, also, the most common disease of mankind. In economically developed countries it reaches 95-98%. According to WHO, the frequency of tooth decay has a tendency to growth, in particular dramatically increase of morbidity among developing countries population, especially in areas of intensive urbanization [4, 6, 8].

The carious process causes changes in the location of occlusal contact points, which is the cause of atypical movements of the mandible. As a result, there is a tooth overload and formation of occlusal trauma, which is accompanied by clinical (enamel cracks as a result of chronic microtrauma, pulpitis of traumatic etiology, movement of the tooth) and X-ray manifestations (for example, the destruction of the filling or part of the tooth crown, fracture of the root, extension of periodontal gap) [1, 4].

The first molars play an important role in the development and functioning of the tooth-jaw system. The position of the first molars determines the alignment of dentitions (Engle's classification) and height of central occlusion, their occlusal surfaces is the directional plane for the mandibular movements. The first molars are a functional center of chewing. Their occlusal surfaces are the most vulnerable places for caries process [2, 3, 7].

As a result of early caries lesion, these teeth change their anatomical shape and relationships with antagonists, which is the reason for the following occlusal disharmony. Clinically,

in locations of premature occlusal contacts, enamel cracks can occur as a result of chronic microtrauma, carious lesions and abrasion of dentin, traumatic pulpitis, tooth movement and others [1, 2, 5, 9].

**The purpose of the research** is to study the prevalence of caries of first molars and its role in the occurrence of occlusal disorders.

## 1. Materials and Methods

We have studied the prevalence of caries lesions in the 300 students of the first 3 years of study at Ivano-Frankivsk National Medical University (IFNMU) and are citizens of Ivano-Frankivsk and regions with low level of fluoride, namely from Rivne, Nadvirna and Verhovyna districts of Ivano-Frankivsk region. We examined: 190 students from Ivano-Frankivsk, 73 of them were boys and 117 – girls; 54 students from Rivne (23 boys and 31 girls); 42 students who are from Nadvirna district (19 boys and 23 girls); 14 students from Verhovyna district (5 boys and 9 girls).

Clinical examination included: anamnesis, dental examination of oral cavity (probing, using special device &lsquo;diagnodent'). A special dental card was developed for examination. It included: passport data of patient, history of the disease (health changes during past year, use of alcohol or drugs, allergic reactions), the history of dental disease (gum disease, rash, dryness in oral cavity, orthodontic treatment, tooth sensitivity, juggling food in the interdental spaces, unpleasant taste or smell from the mouth), dental examination (evaluation of bite, periodontal condition, condition of mu-

cous membrane, presence of caries, fillings, prosthodontic constructions).

To determine the clinical form of caries we use two methods. As a standard we use probing. Diagnostic method using diagnodent (Kavo), which functions with the technology of laser fluorescence, allows to detect caries in the early stages.

## 2. Results and Discussion

According to our study, the carious lesion of first molars was observed most often. Frequency of prevalence of acute caries of first molars was  $22.7\% \pm 2.42$  (Fig. 1) and the chronic  $30.7\% \pm 2.66$  (Fig. 2).

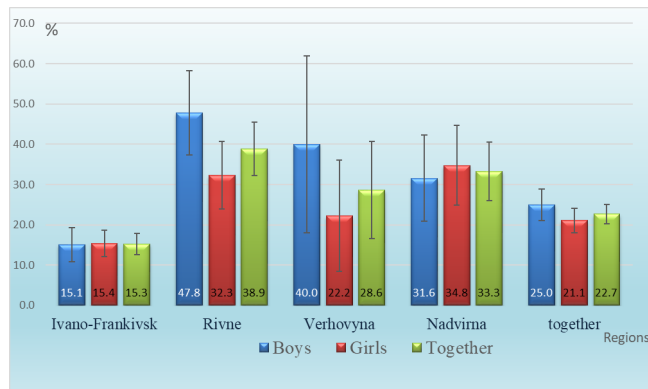


Figure 1. Prevalence of acute caries of first molars

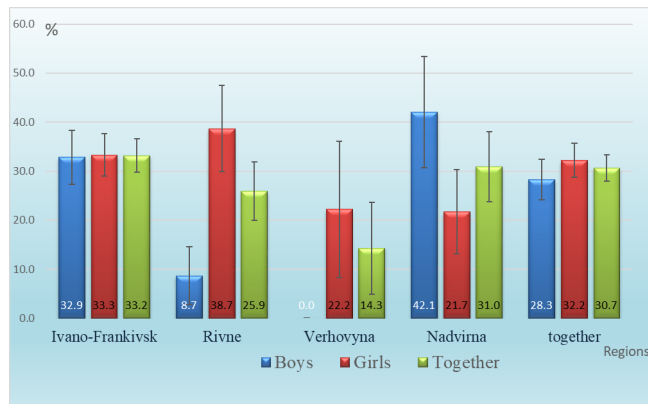


Figure 2. Prevalence of chronic caries of first molars

The acute initial caries of first molars was found in  $3.0\% \pm 0.98$  of the students and prevailed in those, who live in Nadvirna district and Rivne region (Fig. 3).

We noted the presence of acute superficial caries of the first molars in  $4.7\% \pm 1.22$  of all students (Fig. 4).

Acute moderate carious lesion of first molars was  $18.0\% \pm 2.22$  (from  $11.6\% \pm 2.32$  in Ivano-Frankivsk to  $37.0\% \pm 6.57$  in Rivne region) (Fig. 5).

Frequency of acute advanced caries varying from  $7.1\% \pm 3.97$  (Nadvirna district) to  $11.1\% \pm 4.28$  (Rivne region) in

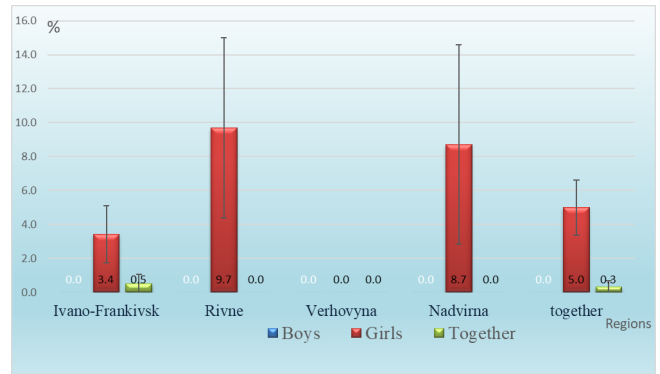


Figure 3. Prevalence of acute initial caries of first molars

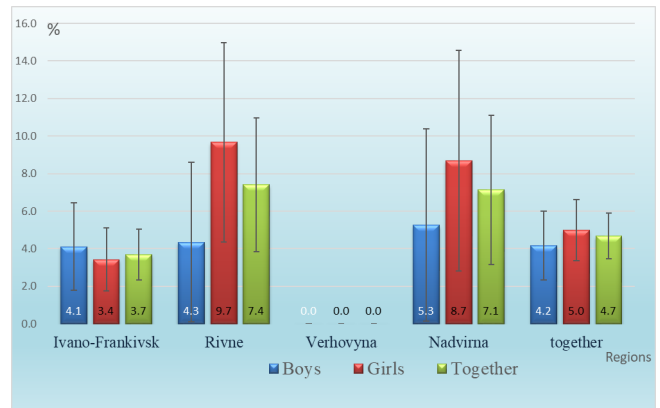


Figure 4. Prevalence of acute superficial caries of first molars

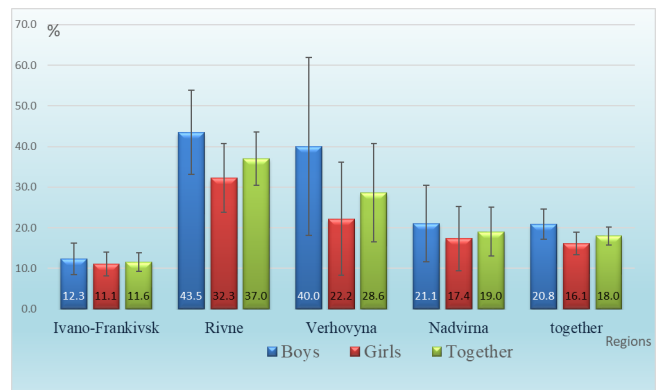


Figure 5. Prevalence of acute moderate caries of first molars

areas with low level of fluoride, unlike Ivano-Frankivsk, where it barely meets ( $0.5\% \pm 0.52$ ). (Fig. 6).

Chronic initial decay of the first molars was present in  $2.7\% \pm 0.93$  of students (Fig. 7).

Prevalence of chronic superficial dental caries was  $21.3\% \pm 2.37$  (Fig. 8).

During the analysis of chronic moderate carious lesions we noticed fluctuations of its frequency from  $3.7\% \pm 2.57$  (Rivne region) to  $11.9\% \pm 5.00$  (Nadvirna district) (Fig. 9).

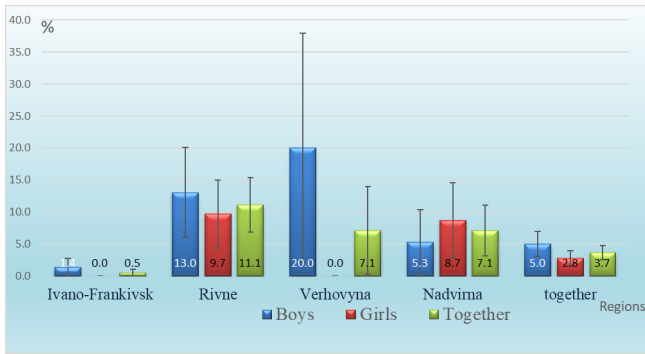


Figure 6. Prevalence of acute deep caries of first molars

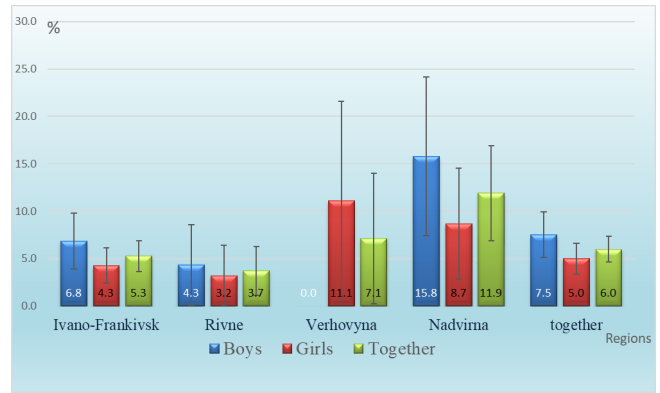


Figure 9. Prevalence of chronic moderate caries of first molars

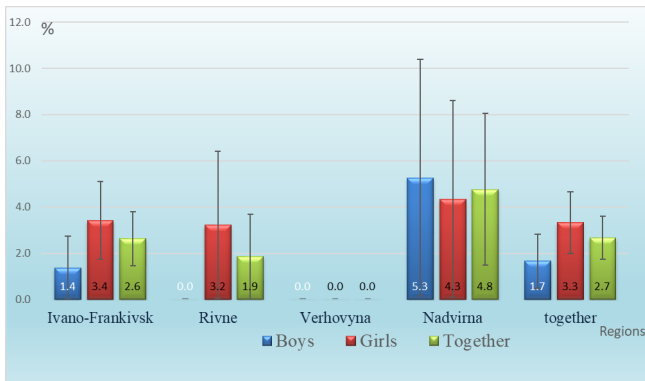


Figure 7. Prevalence of chronic initial caries of first molars

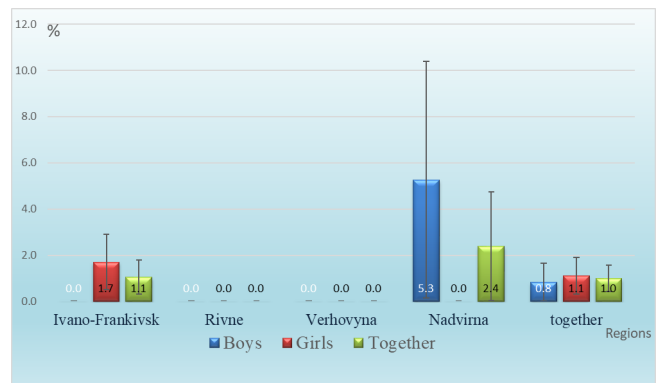


Figure 10. Prevalence of chronic deep caries of first molars

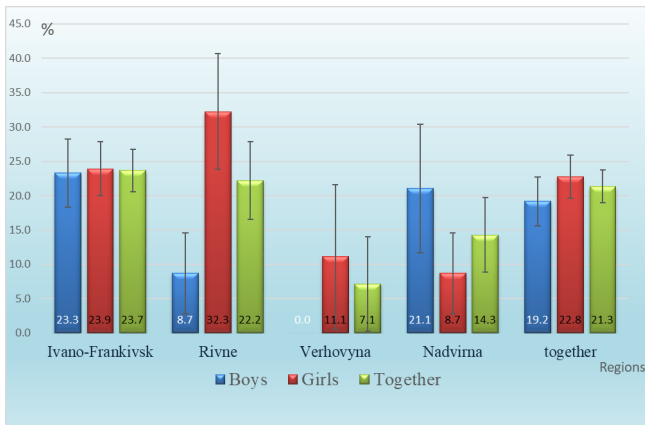


Figure 8. Prevalence of chronic superficial caries of first molars

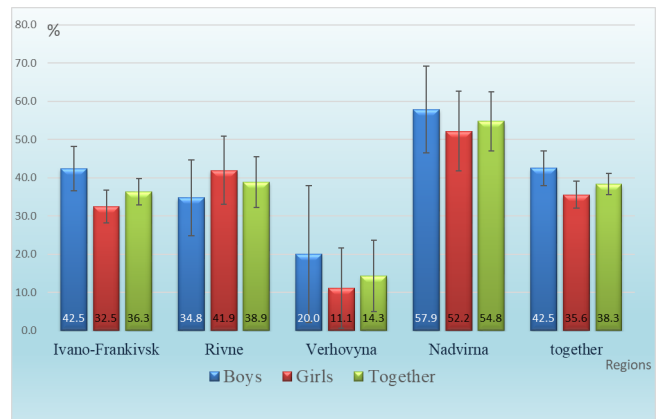


Figure 11. Prevalence of caries on occlusal surface

The prevalence of chronic deep caries is low. According to data of our research it was  $1.0 \pm 0.57$  (Fig. 10).

Data analysis based on localization of carious process on the surfaces of first molars indicates that occlusal surfaces are most often affected ( $38.3\% \pm 2.81$ ) (Fig. 11-12).

It should also be noted that restoration without consideration of occlusal determinants were present in more than half of examined students ( $54.3\% \pm 2.88$ ) (Fig. 13).

In addition, our study found that  $2.3\% \pm 0.87$  had removed

first molars teeth (Fig. 14).

### 3. Conclusions

As a result of early carious lesion (acute process  $22.7\% \pm 2.42$ ; chronic –  $30.7\% \pm 2.66$ ), first molars change their anatomical shape, their clinical crown decreases, the occlusal relationships are also change. It all leads to occlusal overloads and occlusal trauma. The presence of restorations without consid-

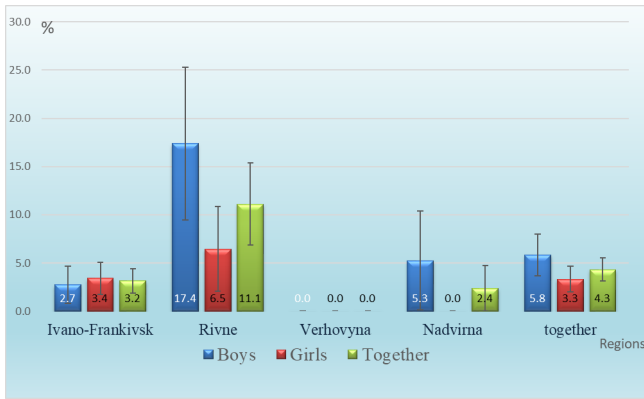


Figure 12. Prevalence of caries on proximal surfaces

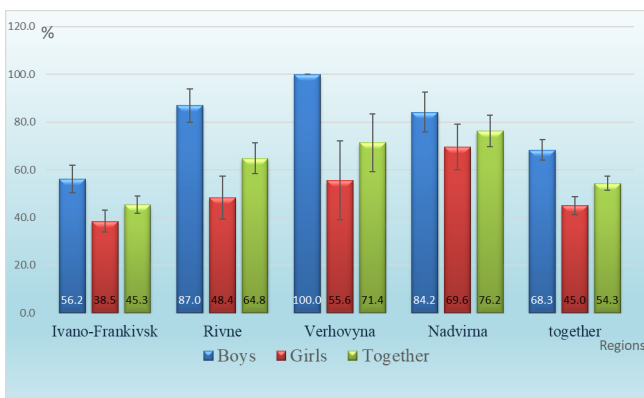


Figure 13. The presence of defective restorations

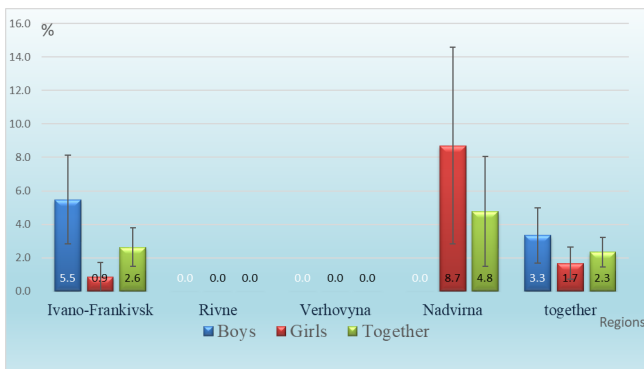


Figure 14. The presence of removed teeth

eration of occlusal determinants was present in the majority of examined students ( $54.3\% \pm 2.88$ ).

Occlusal relationships, which are formed without taking into account the requirements of functional anatomy, lead to change of static and dynamic occlusion. The ignorance of these occlusal components leads to occurrence of occlusal trauma.

#### 4. Prospects for further research

The prospect of further research is the study of the influence of carious lesions on the occurrence of occlusal disorders and establishing the correlation between them.

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