

2. Summary

Helicobacter pylori is a common microorganism in the human population. Its presence in the human digestive tract and its impact on health is the subject of many scientific studies. The oral cavity is a place of existence for a variety of bacterial flora, including *H pylori*, which has been isolated dental plaque, carious lesions, periodontal pockets, inflamed tooth pulp, tongue surface, saliva, as well as from the surface of cancerous ulcers in adults. There is a relationship between the occurrence of *H pylori* bacteria and periodontitis, caries, changes in the oral mucosa, such as leukoplakia, erythroplakia, lichen planus and ulcerative lesion.

The conducted research addressed assessment of the oral health of schoolchildren infected with the *H pylori* bacterium by evaluating: indicators of the presence of plaque in interdental spaces API (Approximal Plaque Index), the frequency of caries in the examined children, the intensity of caries in permanent teeth (DMF, PUW), periodontal inflammation index (SBI-index of periodontal bleeding from periodontal probing and GI-index of periodontitis symptoms).

An attempt was also made to answer the question of whether the presence of *H pylori* infection affects the more frequent occurrence of erosive inflammatory lesions of the oral mucosa, aft, inflammation of the corners of the mouth, as well as how the occlusal conditions and physical parameters in the facial part of the skull change.

In the population of 117 schoolchildren with dyspeptic symptoms, a dental examination has been performed, saliva samples were collected and the presence of *H pylori* infection has been assessed by gastroscopic examination.

The study group consisted of children aged 6-18 with documented *H pylori* infection in the gastric mucosa. The control group consisted of children free of infection, which was defined as the absence of *H pylori* bacteria in the histopathological examination of the gastric mucosa.

Based on the processed data, the presence of *H pylori* infection has been confirmed in 38% of the subjects. Among the examined girls (77 people) the infection has been confirmed in 32.5% and this is a lower rate compared to boys (40 people) where the *H pylori* infection has been detected in 50.0% of the study group. Infection has been found in children living in

the city in 34.2%. 46.3% of the examined children have been infected with *H pylori* in rural areas, inhabited by 41 children. This indicates a higher incidence of infection with this bacterium in children living in rural areas.

When assessing the condition of the teeth, it has been found that children infected with *H pylori* had a higher number of teeth with active caries $P=2.62$ compared to the control group $P=1.22$ ($p=0.02$).

Approximal plaque index (API), assessing oral hygiene, was higher by 5.5% in *H pylori*-infected children and amounted to 52%. API indices in children with no confirmed presence of *H pylori* in the gastric mucosa were 46.5%. Both indicate average hygiene in the group of children studied.

Periodontitis has been assessed using the gingival bleeding index (SBI). Bleeding occurred more frequently in children infected with *H pylori*, $SBI=14\%$, compared to the control group free of infection, in which the $SBI=8\%$ ($p=0.68$). A higher rate of SBI in the group infected with *H pylori* has been found in children living in the city (14.0%).

Also, the GI value indicating mild gingivitis in *H pylori*-infected children was 0.71 and was slightly higher than in children without *H pylori* in the gastric mucosa (0.45). In infected children, slightly higher GI values has been found in urban children.

The analysis of inflammation of the soft tissues of the oral cavity showed a higher incidence of mucosal lesions in children infected with *H pylori* (12.5%) compared to the control group (9.4%). Changes in the mucous membrane were more often observed in rural children. As many as 20% of children living in rural areas had pathologies associated with the mucous membrane compared to 6.2% in urban children ($p=0.05$). This also applied to children from the *H pylori*-infected group. Inflammation of the corners of the mouth in children infected with *H pylori* has been found in 40% of respondents. In children without the presence of *H pylori* in the gastric mucosa, cheilitis has been present in 23.4%. Corner cheilitis has been found more frequently in rural children both in the entire study group (49.0%) and in the group of *H pylori*-infected children living in rural areas (53.3%). Adenoid hypertrophy was also more common, in 36.0% of children infected with *H pylori*, than in children from the control group (26.6%). Adenoid enlargement was more often found in children living in rural areas and also in the group of children infected with *H pylori*.

The analysis of mechanical parameters of saliva has shown high viscosity in 56.7% of infected children compared to 34.4% of children without *H pylori* infection ($p=0.05$). It shows that saliva of higher viscosity is more common in children infected with *H pylori*.

It has also been noted that pathological abrasions of hard dental tissues occur less frequently in children with *H pylori* in the gastric mucosa ($p=0.03$), which may indicate a protective mechanical effect of a greater number of mucins contained in the viscous saliva of infected children.

The functional examination of children showed that in the *H pylori*-infected group the occurrence of speech pathology is more frequent compared in the control group. 29.2% and 9.4%, respectively ($p=0.04$). It has been shown that speech impediments are more common in children living in the countryside (25.7%) than in the city (9.2%) ($p=0.04$). It is even more pronounced when comparing the place of residence of *H pylori*-infected children from the study group.

Also, the infantile type of swallowing (visceral swallowing) is more common in children infected with *H pylori* (75.0%) compared to the control group (62.5%).

The assessment of the respiratory pattern has shown that children infected with *H pylori* more often breathe through their mouths (59.4%), compared to children without infection (54.8%). Statistically significant more frequent ($p=0.01$) occurrence of active carious lesions have been found in *H pylori*-infected children with oral breathing (3.5), compared to non-infected children breathing with a mouth (0.8).

In children with oral respiratory system infected with *H pylori*, there is a statistically significant ($p=0.03$) higher plaque index (Pl.I.=1.2). Oral-breathing children free from this bacterium had a lower plaque index (Pl.I.=0.9). A higher rate of gingivitis (GI=1.0) has been found in children with an oral respiratory tract infected with *H pylori*. Children who are mouth-breather but *H pylori*-free have a statistically significantly lower rate of gingivitis (0.9, $p=0.01$).

An innovative approach to the description of oral health in the study group was the assessment of the occurrence of malocclusion. It has been shown that malocclusion predisposes to a higher number of active carious lesions ($p=0.03$)

and a higher DMFT ($p=0.01$) in the group of infected children. There is a visible more frequent occurrence of malocclusion in infected children living in the countryside.

In children with class II malocclusion, infected with *H pylori*, the value of the Caries-Cavity-Filling index (DMWz) is statistically significantly higher than in the control group and amounts to 8.1 ($p=0.01$). Also, children with class III malocclusion infected with *H pylori* present a statistically significant, higher number of active carious lesions (P) ($p=0.03$) than in the control group.

In children infected with *H pylori* with malocclusion, oral breathing has been found in 45.5% of the examined children, compared to children infected without malocclusion, among whom oral breathing was present in 38.1%. Children infected with *H pylori* who breathe through the mouth had a higher DMF (7.33) compared to children infected through the nose (6.26).

The conducted research allowed us to draw the conclusion in the study group of school children infected with *H pylori*, a greater number of teeth with active caries was found in the child compared to children from the control group. The assessment of the presence of the proximal plaque index showed a slightly higher index in the group of *H pylori*-infected children with a high index in children from the control group. Gingival bleeding has been found to be more common in *H pylori*-infected children living in an urban environment compared to children in the control group. The study of the periodontium in the study group of school children showed a higher GI index in children infected with *H pylori*, including those living in an urban environment. Inflammatory lesions of the oral mucosa and corners of the mouth were also found more often in children infected with *H pylori*. The existing *H pylori* infection in children affects the condition of the teeth, which probably determines the further development of the masticatory apparatus, and the higher incidence of *H pylori* infection in children with malocclusion, abnormal breathing pattern and dysfunction of the speech apparatus requires many further clinical studies.