Prevalence of dental caries in pediatric patients with atopic dermatitis

Abstract. Background. Children with atopic dermatitis may be at increased risk of developing dental caries. This problem is poorly understood and needs attention. The aim of this study was to investigate the oral health status of children and adolescents with atopic dermatitis. Materials and methods. One hundred children with atopic dermatitis aged 2 to 17 years, median of 6 [3.5; 10], and 103 children without atopic dermatitis, median age 7 [5; 12.5] years, were included in the study. Clinical parameters included age, sex, age of onset and severity of atopic dermatitis according to the SCORing AD index (SCORAD). Patients with at least one type of caries at any stage of progression (from white spots to carious lesions with pulpal damage) were included in the caries group. The risk of caries in the atopic dermatitis group and in healthy children, and the significance of the presence of asthma and allergic rhinitis for the development of caries were evaluated using the odds ratio (OR) with a 95% confidence interval (CI). Results were considered statistically significant at the $p < 0.05$ level. Results. Caries was detected in 46 % of children with atopic dermatitis and 22 % controls (OR = 2.9630, CI 1.6131–5.4424, $p = 0.0005$). In the group of allergic rhinitis, 24 patients were found to have caries, and among those without allergic rhinitis, 22 children had caries. It was found that patients with concomitant allergic rhinitis were significantly more likely to develop caries (OR = 3.4406, CI 1.4693–8.0563, $p = 0.0044$). No such significance was found depending on the presence of asthma (OR = 1.3986, CI 0.4913–3.9814, $p = 0.5$). Conclusions. Children with atopic dermatitis have a significantly higher risk of dental caries than healthy children. Based on the results of our study, clinicians should be aware of dental manifestations in patients with atopic dermatitis and recommend regular dental examinations for early caries detection. Keywords: atopic dermatitis; caries; children
Mouth breathing is not only known to be associated with such atopic diseases, including allergic rhinitis (AR) and asthma bronchiale (AS), but is also recognised as one of the common features in patients with AD [10–12]. Breathing through the mouth alters the protective mechanisms of the tissues of the oral cavity, as the oral mucosa is exposed to air during breathing, leading to an increased risk of disease, including the hard tissues of the teeth [13–15]. S.mutans was found to be highly prevalent in 70 % of mouth breathers and 43.3 % of controls, indicating a higher propensity for cariogenic activity [16].

As AD is a chronic, relapsing skin disease, most patients with moderate to severe AD are treated with systemic corticosteroids, immunomodulators and antihistamines. Long-term use of systemic corticosteroids is associated with opportunistic oral infections due to suppression of cellular immunity and phagocytosis. Javad et al. [17] confirmed that Candida albicans was isolated from the oral cavity of 23 % of patients with AD and 6 % of healthy controls (p < 0.05). Antihistamines cause decreased salivation and xerostomia due to their antimuscarinic effects. As salivary secretion plays an important role in caries prevention, antihistamines, which are commonly used in AD, are also considered to be cariogenic drugs [18].

The purpose of this work is to investigate the oral health status of children and adolescents with atopic dermatitis.

Materials and methods

Patients with AD (n = 100), aged 2–17 years, median age 6 years [3.5; 10], from the Allergology Department of Kyiv City Children’s Clinical Hospital 2 were included in the study. The control group consisted of 103 children without AD, median age 7 years [5; 12.5]. This study was approved by the Ethics Committee of the Bogomolets National Medical University (Protocol No. 2 dated October 21, 2020), all patients/parents of sick children gave informed consent to participate. The diagnosis of AD was made according to the criteria of Hanifin & Rajka.

Clinical parameters of the patients included age, sex, age of onset and severity of AD. The severity of AD was assessed using the SCORing index (SCORAD). Patients with at least one carious lesion (from white spots to a carious cavity with pulpal damage) were included in the group of children with carious lesions.

Inclusion criteria were age 2–17 years, duration of AD more than 1 year. Exclusion criteria were as follows: severe systemic disease or malignant neoplasm, mental disorder and impaired psychomotor development.

Statistical processing of the obtained data was performed with the statistical package IBM SPSS Statistics Base (version 22) and the software EZR version 1.32 (graphical interface of the R environment, version 2.13.0). Continuous variables were described as median [I quartile; III quartile], and qualitative variables were presented as frequencies and percentages [n (%)]. The risk of caries in the group with AD and in healthy children and the significance of the presence of BA and AR for the development of caries were estimated by the odds ratio (OR) with a 95% confidence interval (CI). The results were considered statistically significant at the p < 0.05 level.

Results

Dental health was assessed in 100 children with AD, aged 2 to 17 years, median age 6 [3.5; 10], and 103 children without AD, median age 7 [5; 12.5]. There were 56 boys (56 %) and 44 girls (44 %) among the patients, and 49 boys (47 %) and 54 girls (53 %) among the healthy children. The median disease duration in the patient group was 5 [3; 9] years. The median SCORAD severity index was 30 [28; 55] points. In this group of patients, 17 patients had BA and 37 patients had RA.

The following results were obtained: 46 (46 %) children with AD and 23 healthy children (22 %) had carious lesions. The difference was statistically significant (OR = 2.9630, CI 1.6131–5.4424, p = 0.0005). We compared the frequency of caries detection in children with concomitant allergic diseases — BA and RA — and those without. In the group of children with AR, caries was detected in 24 children, in the group of children without AR — in 22 children. It was found that children with concomitant AR had significantly more carious lesions (OR = 3.4406, CI 1.4693–8.0563, p = 0.0044). In the group of children with concomitant AR, caries was found in 9 children, and in the group without AR — in 37 children. No such significance was found depending on the presence of AD (OR = 1.3986, CI 0.4913–3.9814, p = 0.5).

Discussion

This study demonstrated that children with AD are prone to the occurrence and development of carious lesions (OR = 2.9630, CI 1.6131–5.4424, p = 0.0005). In addition, children with concomitant AR also have an increased risk of the occurrence and development of carious lesions (OR = 3.4406, CI 1.4693–8.0563, p = 0.0044). This may be due to the presence of genetic abnormalities of the epithelium and mouth breathing due to obstructed nasal breathing.

Among the multifactorial aetiologies of dental caries, some risk factors, particularly genetic ones, are considered to be common with AD-related factors. In a recent study, polymorphisms in the keratin hair and epithelium gene (KRT75) contributed to increased changes in enamel structure. A possible association between hair disorders and susceptibility to the onset and development of carious lesions has been demonstrated [19]. Similarly, barrier abnormalities in Alzheimer’s disease, also caused by various genetic mutations, may play a role in caries pathogenesis [20]. The distal homebox gene has been shown to play a critical role in both enamel formation and regulation of epithelial differentiation, and a polymorphism in the Toll-like receptor 2 gene has also been associated with both AD and dental caries [21]. The filaggrin gene, which is expressed in both skin and oral mucosa, also influences the pathogenesis of dental caries in AD patients [22]. Thus, the absence of filaggrin in the oral mucosa contributes to epidermal barrier dysfunction, leading to dryness and infections caused by Streptococcus mutans, Streptococcus sobrinus and Lactobacilli [9].

Diseases of the oral cavity, such as caries and gingivitis, can have a negative impact on people’s quality of life, and in the case of AD, the poor condition of the oral cavity may hinder its treatment and worsen its clinical manifestations [23]. A study of Igawa et al. showed that adults with AD who...
had focal odontogenic infections (30%) had a significant improvement in skin manifestations after 3 months of dental treatment [23]. Furthermore, a longitudinal study of Kalhan et al. (2017) found an association between early childhood caries and AD. They observed that children with AD had a higher risk of carious lesions occurring and developing at the age of 3 years (35.8%) [9]. The authors believe that the association between these conditions is due to ectodermal defects that occurred during tissue development, as both caries and AD are associated with defects in structural genes (TLR2). In this study, carious lesions were observed in 41.3% of patients, with a higher frequency in the mild AD group (45.16%) compared to the moderate AD (40%) and severe AD (37.5%) groups, although the difference was not statistically significant (p > 0.05) [10].

In the study of Stofella Sodré C., was presented information that the index of decayed, missing and filled teeth in the permanent dentition (DMFT) was significantly higher in patients with mild AD than in patients with moderate AD (0.59; SD ± 1.06 vs. 0.07; SD ± 0.25; p = 0.011) [7].

Scientific studies conducted with inclusion of patients with other atopic diseases, such as AD and RA, have shown conflicting results regarding the relationship between dental disease and manifestations of allergic disease in children and adolescents [14, 24]. A study of Shulman et al. discovered that adolescents with severe AD with permanent teeth had lower DMFT and fewer carious lesions than systemically healthy controls, but the same relationship was not significant in children with primary dentition [25]. Hassanpour et al. (2019) have found a higher mean DMFT in patients with AD than in a healthy group (p < 0.05) [26]. This finding supports the results of the paper showing that patients with AD who used inhaled corticosteroids were 6.4 times more likely to have carious lesions than patients who did not use inhaled corticosteroids.

So in our opinion, with is supported by the results of previous studies, there is an association between AD and poor dental health in children. Children with AD form a risk group for the development of dental hard tissue disease and should be the focus of dental disease prevention efforts.

Conclusions

Children with atopic dermatitis have a significantly higher risk of carious lesions than healthy children. Based on the results of our study, clinicians should be aware of dental manifestations in patients with atopic dermatitis and recommend regular dental examinations for early detection of carious lesions and prevention of their complications. Further studies with a prospective longitudinal design and more accurate diagnostic systems are needed to test the direct role of atopic dermatitis in the onset and progression of dental hard tissue lesions.

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References


Поширеність карієсу в педіатричних хворих на атопічний дерматит

Резюме. Актуальність. Діти з атопічним дерматитом можуть мати підвищений ризик розвитку карієсу. Ця проблема є мало вивченою та потребує уваги.

Матеріали та методи. У дослідження були включені 100 пацієнтів віком від 7 до 12 років. Крім 82 дітей з алергічним ринітом, були включені до групи карієс, 18 дітей з атопічним дерматитом.

Результати. Карієс мали 46 % пацієнтів, хворих на атопічний дерматит, та 22 % дітей контрольної групи (p = 0.0005). У групі без алергічного риніту — 22. Було виявлено, що в дітей з супутнім алергічним ринітом карієс розвивався вірогідно частіше (p = 0.0005). У групі алергічного риніту 24 особи мали карієс.

Висновки. Діти, хворі на атопічний дерматит, мають значно вищий ризик розвитку карієсу, ніж здорові. Виходячи з результатів нашого дослідження, лікарі повинні відповідати регулярним стоматологічним оглядах для раннього виявлення карієсу.

Ключові слова: атопічний дерматит; карієс; діти