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FEATURES OF CARIES AND PERIODONTAL DISEASES COURSE IN ADOLESCENTS WITH JUVENILE IDIOPATHIC ARTHRITIS (LITERATURE REVIEW)

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ОСОБЛИВОСТІ ПЕРЕБІГУ КАРІЕСУ ТА ЗАХВОРЮВАНЬ ПАРОДОНТА У ПІДЛІТКІВ, ЯКІ ХВОРІЮТЬ НА ЮВЕНІЛЬНИЙ ІДІОПАТИЧНИЙ АРТРИТ (ОГЛЯД ЛІТЕРАТУРИ)

INFORMATION

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ABSTRACT

Systemic diseases have a significant impact on dental health, and these relationships are mutually reciprocal. One example of a general somatic pathology is juvenile idiopathic arthritis, which determines the relevance of scientific research aimed at studying the features of its course and developing mechanisms for the prevention of leading dental diseases. According to scientific research, dental pathologies such as caries and periodontal tissue lesions are most often found among adolescents. The presence of comorbidity often complicates ensuring an adequate level of individual hygiene and contributes to an increase in dental morbidity, and therefore, conducting research in this area seems to us to be promising. **Purpose of the Study.** To analyze scientific publications that highlight the impact of juvenile idiopathic arthritis on the development and course of caries and inflammatory diseases of periodontal tissues.

Materials and Methods of the Study. A search was conducted in the scientific databases Web of Science, PubMed, Google Scholar, Scopus and archives of domestic professional scientific journals using the keywords “juvenile arthritis”, “caries”, “gingivitis” and “periodontium” with the formation of a query using boolean operators.

Results of the Research and Their Discussion. The analysis of scientific sources revealed that several researchers emphasize the increase in the intensity of the caries in adolescents with JIA in comparison with those without comorbidity. There are hypotheses regarding the potential influence of disease-specific characteristics on the values of intensity of the caries indices. On the other hand, several scientific publications provide data demonstrating the absence of the impact of the rheumatological disease under study on the course of caries. Regarding the course of periodontal diseases in adolescents with JIA, the authors emphasize the increased tendency to the accumulation of dental plaque, the development of gum bleeding, the presence of changes in bone mineral density and disorders of immune mechanisms, which undoubtedly determine the specific features of the course of this dental pathology in adolescents with JIA. However, many researchers do not confirm the theory of the presence of clinical features of the course of periodontal diseases in patients with JIA.

The identified discrepancies necessitate further scientific research in the mentioned areas.

Conclusions. Given the steady increase in the prevalence of juvenile idiopathic arthritis in Ukraine, the study of the features of the course of major dental diseases against the background of this rheumatological pathology is of particular relevance. The diversity of data obtained during the analysis of scientific sources on the subject further emphasizes the need for scientific research in the indicated area.

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АНОТАЦІЯ

Системні захворювання мають вплив на стан стоматологічного здоров'я, причому ці зв'язки є взаємонапрямленими. Одним із складів загальносоматичної патології є ювенільний ідіопатичний артрит, що зумовлює актуальність наукових досліджень, спрямованих на вивчення особливостей його перебігу та розробку механізмів профілактики провідних стоматологічних захворювань. За даними наукових досліджень, серед підлітків найчастіше зустрічаються такі стоматологічні патології, як карієс і ураження тканин пародонта. Наявність супутньої патології нерідко ускладнює забезпечення належного рівня індивідуальної гігієни та сприяє зростанню показників стоматологічної захворюваності, у зв'язку із чим проведення досліджень у зазначеному напрямі вбачається нами доцільним і перспективним.

Мета дослідження – провести аналіз наукових публікацій, що висвітлюють вплив ювенільного ідіопатичного артриту на розвиток і перебіг карієсу та запальних захворювань тканин пародонта.

Матеріали та методи дослідження. Здійснено пошук у наукових базах Web of Science, PubMed, Google Scholar, Scopus та архівах вітчизняних фахових наукових видань за ключовими словами «ювенільний артрит», «карієс», «гінгівіт» і «пародонт» з утворенням запиту за допомогою логістичних операторів.

Результати досліджень та їх обговорення. Проведений аналіз наукових джерел виявив, що ряд дослідників наголошують на зростанні інтенсивності каріозного процесу в підлітків з ЮІА порівняно з показниками осіб без супутньої патології. Існують гіпотези щодо наявності потенційного впливу хворобоспецифічних характеристик на значення індексів інтенсивності каріозного процесу. З іншого боку, у низці наукових публікацій наведено дані, що свідчать про відсутність впливу досліджуваного ревматологічного захворювання на перебіг карієсу. Стосовно перебігу захворювань пародонту в підлітків із ЮІА автори підкреслюють підвищену схильність до накопичення зубного нальоту, розвитку кровоточивості ясен, наявність змін мінеральної щільності кісткової тканини та порушень імунних механізмів, що, безперечно, визначає специфічні особливості перебігу цієї стоматологічної патології у підлітків з ЮІА. Проте ряд дослідників не підтверджують теорії наявності клінічних особливостей перебігу захворювань пародонту на тлі ЮІА. Виявлені невідповідності зумовлюють необхідність подальшого наукового пошуку в зазначених напрямках.

Висновки. З огляду на стає зростання поширеності ювенільного ідіопатичного артриту в Україні дослідження особливостей перебігу основних стоматологічних захворювань на тлі цієї ревматологічної патології набуває особливої актуальності. Різнострамованість даних, отриманих під час аналізу наукових джерел за тематикою, додатково підкреслює потребу в науковому пошуку в окресленому напрямі.

Introduction. According to modern scientific knowledge, systemic diseases can affect dental health [1], and the relationship between them is bidirectional [2], [3]. One of such diseases is juvenile idiopathic arthritis (JIA), which, according to the definition of the International League of Rheumatology Associations (ILAR), is arthritis of unknown etiology that debuts before the age of 16 and lasts at least 6 weeks, and other known conditions are excluded. According to official data, the prevalence of this disease in Ukraine is 0.36 cases per 1000 people with a fairly pronounced tendency to increase [4]. In view of the above, the study of the features of the course of dental pathology against the background of the above-mentioned underlying disease is extremely relevant.

According to the Global Burden of Disease study, despite the increase in our knowledge about the etiology of caries and the improvement of preventive mechanisms, about 2.8 billion people suffer from caries of permanent teeth [5]. According to the literature review conducted by Kaskova L. F. et al., there is a tendency for the prevalence of caries among children to increase in Ukraine: for example, in Zakarpattia, the prevalence of caries during the period of temporary occlusion was 96.87%, during the mixed dentition period – 96.15%; among children living in environmentally unfavorable areas of Lviv region, the prevalence of caries was 42.7%; 96.73% was the prevalence of caries among children in Bukovina [6]. Some researchers emphasize that concomitant diseases increase the risk of caries development. In childhood, this is often explained by the fact that oral care is secondary to solving problems associated with the general disease, and sweet products containing sugar are often used to calm the child [7].

According to current ideas, the most common periodontal pathology is considered to be chronic gingivitis caused by dental plaque, gingivitis associated with steroid hormones, as well as drug-induced gingival hyperplasia [8]. Literature review data indicate that the frequency of gingivitis in children aged 6 to 18 years ranges from 20% to over 90%, depending on the geography of the study, the age group and the diagnostic criteria used [9]. According to Holubieva I. et al., gingivitis associated with biofilm is detected in 89.8% of children and adolescents aged 12–17 years in the Kyiv region, which indicates its rather high prevalence [10]. Since the inflammatory process at the border of bone and connective tissue in JIA is largely similar to the processes observed in inflammatory-destructive periodontal diseases, and both nosologies develop in patients with impaired regulation of the immune response [11], we consider it logical to assume that there are specific features of the course of periodontal diseases in patients with this rheumatological disease.

In our opinion, this emphasizes the need to analyze scientific sources regarding the influence of JIA on the development of caries and pathologies of periodontal tissues.

Purpose of the Study. To analyze scientific publications that highlight the impact of juvenile idiopathic arthritis on the development and course of caries and inflammatory diseases of periodontal tissues.

Materials and Methods of the Study. To study the features of caries and periodontal tissue diseases course, a search for scientific sources was conducted using the keywords “juvenile arthritis”, “caries”, “gingivitis” and “periodontium”. With the help of logistic operators, a search query was created, which was conducted in the scientific databases PubMed, Web of Science, Scopus, Google Scholar, as well as in the archives of domestic professional scientific publications. After a critical review, 25 scientific papers were selected that correlated with the purpose.

Research Results and Their Discussion. The study of caries course in individuals with JIA seems to be of high scientific interest, taking into account experimental research, in which juvenile adjuvant arthritis, the most relevant to the JIA model, was simulated on experimental animals. Thus, it was found that in the adjuvant arthritis group medium-depth or deep lesions prevail compared to superficial and medium in the control group, and the obtained differences were statistically significant [12].

During the analysis of domestic scientific sources that highlight the features of caries course in patients with JIA, we identified two sources that most fully met the search criteria. Thus, Pylypyuk O. Yu., in the PhD thesis, emphasizes that children with JIA have a 2–3 times higher caries intensity compared to children without comorbidity, while the course of the analyzed dental disease in them is decompensated, compared to the compensated one in children of the control group [13]. Analysis of the structure of carious lesions, which was conducted by the author's team from Vinnytsia, also revealed the predominance of acute initial forms of dental disease in permanent teeth of children with JIA [14], which, in our opinion, can be regarded as a decrease in nonspecific resistance of hard tooth tissues in this category of patients.

During the analysis of foreign scientific sources on the course of caries, we found quite contradictory results. Researchers from the UK note that children under 11 years of age with juvenile idiopathic arthritis (JIA) demonstrate increased frequency of dental caries compared with the control group. In addition, these children have a greater number of destroyed or missing teeth and fewer filled teeth, compared with children without comorbidity. In other age groups, the described trends also persisted, but the obtained differences were not statistically

significant. This allowed the authors to conclude that children with JIA are more prone to caries or that there are certain obstacles to providing adequate dental care to this category of patients [15]. Similar data on statistically significantly higher values of the DMF index in children with JIA in Brazil are provided by Savioli C. et al. [16].

At the same time, several studies indicate the absence of the above-described trends in the course of caries in children with JIA. Another research group from Brazil did not confirm the presence of a statistically significant increase in the intensity of caries of permanent teeth in children with JIA compared with the control group; on the contrary, they noted statistically significantly lower values of the df index in patients with this disease compared with children without concomitant pathology [17]. The hypothesis of a significant difference in the intensity of the caries in patients with JIA was also rejected by researchers from Norway, Turkey, Brazil and Poland [18, 19, 20, 21].

It is worth noting the study by Pugliese C. et al., which did not confirm the previously mentioned hypothesis, but revealed a direct, albeit weak, correlation between the DMF index value and the JADAS (Juvenile Arthritis Disease Activity Score) scale of the underlying disease [22], which, in our opinion, defines a separate scientific direction dedicated to studying the influence of specific features of JIA on the development of caries.

The study by Merle C. L. et al. analyzed these characteristics, and the authors noted that neither the localization of the affected joint, nor the limitation of mouth opening, nor the pain in the TMJ at the time of the study or in the anamnesis, nor the duration of the underlying disease have a statistically significant effect on the DMF index in children with JIA [23].

The results of the study by Grevich S. et al., which indicate a trend towards lower DMF index values in children with JIA compared to children with dental pathology, should be especially noted; at the same time, the obtained indicators were higher than in children of the control group, however, these differences were not statistically significant [24].

The heterogeneity of data presented in domestic and foreign sources, in our opinion, emphasizes the relevance of conducting national scientific research aimed at studying the trends, features of the prevalence and severity of caries in children with JIA in Ukraine.

Analysing the prevalence and characteristics of periodontal diseases in JIA deserves attention a meta-analysis of data conducted by Jin Tang et al., in which the authors found statistically significantly higher values of the OHI-S and PI hygiene indices, increased gingival index (GI), as well as a greater level of clinical attachment loss (CAL ≥ 2 mm) and periodontal pocket depth (PD ≥ 4 mm) compared to

the control group. The authors explain these results by the fact that patients with JIA have limited mobility of the upper extremities and TMJ, which makes it difficult to carry out effective personal hygiene. This contributes to the accumulation of supragingival dental deposits and, as a result, the development of biofilm-associated periodontal diseases [25].

The NorJIA study found an increased intensity of supragingival deposits and a greater tendency to gum bleeding in children with JIA compared to controls. It is also important that the authors identify the age of onset of JIA as a prognostic factor for the course of periodontal pathology in children with JIA – children whose disease onset occurred at the age of over 6 years have a higher risk of dental plaque formation compared to the group of children whose disease onset occurred at a younger age. The group of teeth most prone to plaque deposition in both children with JIA and children in the control group was molars (compared to the frontal group of teeth) [26].

Research by scientists from Sweden – C. Starkhammar Johansson et al. found a direct correlation between moderate titers of *P. gingivalis* and *T. forsythia* in subgingival microbial films (which, according to the study by Ximénez-Fyvie L. A. et al. [27], are considered the main periodontal pathogens) and the values of the plaque index, which indicates the need for high-quality individual and professional oral hygiene. At the same time, the study did not confirm the presence of a correlation between the concentrations of these bacteria and the gingival bleeding index. According to the results obtained by the authors, the level of *P. gingivalis*, according to their assessment, correlated with systemic inflammatory activity (determined using C-reactive protein), which allowed the researchers to suggest the presence of a potential systemic, and not only local, effect of this microorganism on the activity of JIA [28].

The idea of the systemic influence of periodontal pathogens on the course of JIA was also reflected in the work of Lange L. et al., which was devoted to the study of the activity of the course of JIA with positive antibodies to cyclic citrulline peptide (CCP). Thus, with the CCP-positive variant of JIA, patients have an increased production of antibodies to *P. gingivalis* compared to those in children with CCP-negative JIA. This, according to the authors, indicates the involvement of inflammation of periodontal tissues or periodontal pathogens in the development of the CCP-positive variant of the studied systemic disease. The study also emphasizes that children with JIA who are CCP-positive more often have signs of periodontal diseases (tooth sensitivity and gum bleeding) compared to CCP-negative patients. The authors also obtained data on a higher prevalence of redness and swelling of the

gums in children with CCP-positive JIA compared to the control group, but the obtained results were not statistically significant [29].

In the context of studying the influence of the immune status on the course of inflammatory periodontal diseases in patients with JIA, attention should be paid to the research performed by Miranda L. A. et al., which showed an increased level of IL-18 and IL-1 β in the blood serum of children with JIA compared to children without comorbidity. According to the authors, these results indicate a systemically altered immune response in children with this rheumatic disease, which undoubtedly makes them more prone to the development of inflammatory periodontal diseases. The data they obtained on increased titers of IL-18 and a homogeneous microbiota in JIA patients with loss of clinical attachment indicate the involvement of this immunoglobulin in the processes of destruction of periodontal tissues in this group of patients [30]. The obtained data are partially confirmed by the studies of Joosten L. A. B. et al., who showed that when analyzing the synovial fluid of the knee joint of patients with rheumatoid arthritis, IL-18 participates in local and systemic links of the inflammatory process by stimulating the production of IL-1 β and tumor necrosis factor (TNF)- α by monocytes and macrophages [31]. The authors' caution regarding the absence of IL-18 in periodontal tissues and, accordingly, the invalidity of the results obtained is partially explained by the experimental study of Rouabhia M. et al., in which the possibility of IL-18 synthesis by gingival epithelial cells in response to infection with a pathogenic microorganism was revealed in vitro [32].

The further study of the authors' team is also interesting, in which they note that with adequate therapy of the underlying disease, not only do rheumatological indicators improve, but there is also a decrease in the amount of plaque while the degree of gingival bleeding and the length of the loss of gingival attachment zones remain unchanged. Analysis of the cytokine profile of patients with JIA revealed a statistically significant decrease in IL-1 β titers two years after specific treatment of the underlying disease. The authors also stated that after two years of JIA therapy, no statistical differences were found in clinical or laboratory

indicators of periodontal status, which indicated the absence of the influence of the underlying disease on the course of inflammatory processes in periodontal tissues [33].

Considering the influence of JIA on the state of periodontal tissues, it is worth noting the study by Silva T. L. et al., in which the authors show that children with this disease have a statistically significant decrease in alveolar bone mineral density compared to children in the control group. These changes are not associated with either medication or rheumatic disease activity [34].

A study by Kobus A. et al., which is related to the above, showed increased levels of matrix metalloproteinases (MMPs), in particular MMP-8, which contribute to the degradation of periodontal tissues, loss of clinical attachment and increased depth of periodontal pockets, which leads to the development of periodontitis. In addition, the authors note that patients with JIA have an increased risk of osteopenia and delayed bone development against the background of a systemic decrease in bone mineral density, which directly affects the state of the alveolar bone [35].

In contrast to the previously mentioned trends, Pugliese C. et al. note that the frequency of gingivitis in children with JIA does not differ from that in controls. At the same time, the authors confirmed the presence of a correlation between the oral hygiene index and the level of JIA activity according to the JADAS scale [36].

The presence of contradictory data on the influence of specific features of JIA on the course of periodontal diseases emphasizes the relevance of further research on this issue in order to confirm or refute the hypotheses proposed by the authors in the analyzed scientific sources.

Conclusions. Taking into account the high prevalence of juvenile idiopathic arthritis (JIA) in Ukraine and the need to provide qualified dental care to patients in this category, conducting domestic scientific research devoted to studying the features of the course of caries and periodontal diseases seems particularly relevant.

The diversity of existing hypotheses and trends regarding the development of these dental nosologies against the background of JIA, in our opinion, also confirms the need for further research in this direction.

Bibliography

1. Kapila Y. L. Oral health's inextricable connection to systemic health: Special populations bring to bear multimodal relationships and factors connecting periodontal disease to systemic diseases and conditions. *Periodontology* 2000. 2021. Vol. 87 (1). P. 11–16. DOI: <https://doi.org/10.1111/prd.12398>.
2. Natarajan P., Madanian S., & Marshall S. Investigating the link between oral health conditions and systemic

- diseases: A cross-sectional analysis. *Scientific reports*. 2025. Vol. 15 (1), 10476. DOI: <https://doi.org/10.1038/s41598-025-92523-6>.
3. D'Aiuto F., Suvan J., Siripaiboonpong N., Gatzoulis M. A., & D'Aiuto F. The root of the matter: Linking oral health to chronic diseases prevention. *International journal of cardiology. Congenital heart disease*. 2025. Vol. 19, 100574. DOI: <https://doi.org/10.1016/j.ijcchd.2025.100574>.
 4. Коваленко В. М., Шуба Н. М., Яременко О. Б., Омельченко Л. І., Борткевич О. П., Марушко Т. В., Проценко Г. О., Гармш О. О., Тер-Варганьян С. Х., Свінцицький А. С., & Герасименко С. І. Дискусійні питання обґрунтування статусу діагнозу «ювенільний ревматоїдний артрит» в категорії дорослого населення у випадках дебюту хвороби в дитячому та підлітковому віці. *Український ревматологічний журнал*. 2016. № 1. С. 21–24.
 5. D'Aiuto F., Suvan J., Siripaiboonpong N., Gatzoulis M. A., & D'Aiuto F. The root of the matter: Linking oral health to chronic diseases prevention. *International journal of cardiology. Congenital heart disease*. 2025. Vol. 19, 100574. DOI: <https://doi.org/10.1016/j.ijcchd.2025.100574>.
 6. Каськова Л., Моргун Н., Янко Н., Ващенко І., Хміль О., Андріянова О. Проблема карієсу тимчасових зубів у дітей (огляд літератури). *Український стоматологічний альманах*. 2025. № 1. С. 71–77. DOI: <https://doi.org/10.31718/2409-0255.1.2025.12>.
 7. Pedersen A. M. L. Oral Infections and General Health. Springer Cham. 2016. DOI: <https://doi.org/10.1007/978-3-319-25091-5>.
 8. Liu X., Xu J., Li S., Wang X., Liu J., & Li X. The prevalence of gingivitis and related risk factors in schoolchildren aged 6–12 years old. *BMC oral health*. 2022. Vol. 22 (1), 623. DOI: <https://doi.org/10.1186/s12903-022-02670-9>.
 9. Elgasmī F. E., Maghous K., & Badre B. Gingivitis in children and adolescents: epidemiological overview and associated factors-A narrative review. *Frontiers in oral health*. 2025. Vol. 6, 1675033. DOI: <https://doi.org/10.3389/froh.2025.1675033>.
 10. Holubieva I., Kolenko J., Khomenko L., Ostapko O., Semenova I., & Voronina, I. Local Risk Factors in the Development of Periodontal Diseases in Children and Adolescents. *Bulletin of Stomatology and Maxillofacial Surgery*. 2024. Vol. 20 (1). P. 139–149. DOI: <https://doi.org/10.58240/1829006X-2024.1-139>.
 11. Leksell E., Ernberg M., Magnusson B. & Hedenberg-Magnusson B. (2008), Intraoral condition in children with juvenile idiopathic arthritis compared to controls. *International Journal of Paediatric Dentistry*. 2008. Vol. 18. P. 423–433. DOI: <https://doi.org/10.1111/j.1365-263X.2008.00931.x>.
 12. Kulygina V. M., Pylypiuk O. Y., Turchyn I. V., Gadzhula N. G., Shinkaruk-Dykovytska M. M., Povsheniuk A. V., & Kovalchuk L. O. A study of the influence of juvenile adjuvant arthritis on dental hard tissues condition in experimental animals. *Wiadomosci lekarskie*. 2023. Vol. 76 (11), 2383–2388. DOI: <https://doi.org/10.36740/WLek202311107>.
 13. Пилипюк О. Ю. Обґрунтування комплексної профілактики і лікування карієсу зубів у дітей з ювенільним ревматоїдним артритом : автореф. дис. ... канд. мед. наук, Державний вищий навчальний заклад «Ужгородський національний університет». 2019.
 14. Пилипюк О. Ю., Кулигіна В. М., Шінкарук-Диковицька М. М., Алексеенко Н. С., Ваховський В. В. Результаты клінічного стоматологічного обстеження дітей препубертатного і пубертатного віку з ювенільним ревматоїдним артритом. *Вісник проблем біології і медицини*. 2020. № 4. С. 365–369. DOI: <https://doi.org/10.29254/2077-4214-2020-4-158-365-369>.
 15. Welbury R. R., Thomason J. M., Fitzgerald J. L., Steen I. N., Marshall N. J., & Foster H. E. Increased prevalence of dental caries and poor oral hygiene in juvenile idiopathic arthritis. *Rheumatology (Oxford, England)*. 2003. Vol. 42 (12). P. 1445–1451. DOI: <https://doi.org/10.1093/rheumatology/keg395>.
 16. Savioli C., Silva C. A., Ching L. H., Campos L. M., Prado E. F., & Siqueira J. T. Dental and facial characteristics of patients with juvenile idiopathic arthritis. *Revista do Hospital das Clinicas*. 2004. Vol. 59 (3). P. 93–98. DOI: <https://doi.org/10.1590/s0041-87812004000300001>.
 17. Santos D., Silva C., & Silva M. Oral health and quality of life of children and adolescents with juvenile idiopathic arthritis according to their caregivers' perceptions. *Special care in dentistry: official publication of the American Association of Hospital Dentists, the Academy of Dentistry for the Handicapped, and the American Society for Geriatric Dentistry*. 2015. Vol. 35 (6). P. 272–278. DOI: <https://doi.org/10.1111/scd.12129>.
 18. Gil E. G., Åström A. N., Lie S. A., Rygg M., Fischer J., Rosén A., Bletsa A., Luukko K., Shi X. Q., Halbig J., Frid P., Cetrelli L., Tylleskär K., Rosendahl K., & Skeie M. S. Dental caries in children and adolescents with juvenile idiopathic arthritis and controls: a multilevel analysis. *BMC oral health*. 2021. Vol. 21 (1), 417. DOI: <https://doi.org/10.1186/s12903-021-01758-y>.
 19. Çalıřkan C., Durmuř B., Yıldırım H. S., Demir F., & Sözeri B. Comparison of Oral Health and Salivary Biomarkers in Children with Juvenile Idiopathic Arthritis and Healthy Individuals. *Nigerian Journal of Clinical Practice*. 2023. Vol. 26 (12). P. 1808–1816. DOI: https://doi.org/10.4103/njcp.njcp_169_23.
 20. Feres de Melo A. R., Ferreira de Souza A., de Oliveira Prestrelo B., & Leite M. F. Clinical oral and salivary parameters of children with juvenile idiopathic arthritis. *Oral surgery, oral medicine, oral pathology and oral radiology*. 2014. Vol. 117 (1). P. 75–80. DOI: <https://doi.org/10.1016/j.o000.2013.08.024>.
 21. Kobus A., Bagińska J., Łapińska-Antończuk J., Ławicki S., & Kierklo A. Levels of Selected Matrix Metalloproteinases, Their Inhibitors in Saliva, and Oral Status in Juvenile Idiopathic Arthritis Patients vs. Healthy Controls. *BioMed research international*. 2019. 7420345. DOI: <https://doi.org/10.1155/2019/7420345>.
 22. Pugliese C., van der Vinne R. T., Campos L. M., Guardieiro P. R., Savioli C., Bonfá E., Pereira R. M., Viana V. S., Borba E. F., & Silva C. A. Juvenile idiopathic arthritis activity and function ability: deleterious effects in periodontal disease? *Clinical rheumatology*. 2016. Vol. 35 (1). P. 81–91. DOI: <https://doi.org/10.1007/s10067-015-3125-5>.
 23. Merle C. L., Hoffmann R., Schmickler J., Rühlmann M., Challakh N., Haak R., Schmalz G., & Ziebolz D. Comprehensive Assessment of Orofacial Health and Disease Related Parameters in Adolescents with Juvenile Idiopathic Arthritis-A Cross-Sectional Study. *Journal of clinical medicine*. 2020. Vol. 9 (2), 513. DOI: <https://doi.org/10.3390/jcm9020513>.
 24. Grevich S., Lee P., Leroux B., Ringold S., Darveau R., Henstorf G., Berg J., Kim A., Velan E., Kelly J., Baltuck C., Reeves A., Leahey H., Hager K., Brittnacher M., Hayden H., Miller S., McLean J., & Stevens A. Oral health and plaque microbial profile in juvenile idiopathic arthritis. *Pediatric*

- rheumatology online journal*. 2019. Vol. 17 (1), 81. DOI: <https://doi.org/10.1186/s12969-019-0387-5>.
25. Tang J., Dong L., Ran J., Liu Z., & Li Y. Association between juvenile idiopathic arthritis and periodontal diseases: a systematic review and meta-analysis. *Journal of Clinical Pediatric Dentistry*. 2023. Vol. 47 (5). P. 19–31. DOI: <https://doi.org/10.22514/jocpd.2023.050>.
 26. Gil E. G., Åström A. N., Lie S. A., Rygg M., Fischer J., Rosén A., Bletsa A., Luukko K., Shi X. Q., Halbig J., Frid P., Cetrelli L., Tylleskär K., Rosendahl K., & Skeie M. S. Dental plaque and gingival bleeding in adolescents with juvenile idiopathic arthritis and controls: a multilevel analysis. *Acta odontologica Scandinavica*. 2023. Vol. 81 (1). P. 50–65. DOI: <https://doi.org/10.1080/00016357.2022.2078505>.
 27. Ximénez-Fyvie L. A., Haffajee A. D., & Socransky S. S. Comparison of the microbiota of supra- and subgingival plaque in health and periodontitis. *Journal of clinical periodontology*. 2000. Vol. 27 (9). P. 648–657. DOI: <https://doi.org/10.1034/j.1600-051x.2000.027009648.x>.
 28. Starkhammar Johansson C., Dimitrijevic Carlsson A., Wahlund K., & Alstergren P. Periodontal Health in Children with Juvenile idiopathic arthritis. *European journal of paediatric dentistry*. 2024. Vol. 25 (1). P. 36–41. DOI: <https://doi.org/10.23804/ejpd.2024.1913>.
 29. Lange L., Thiele G. M., McCracken C., Wang G., Ponder L. A., Angeles-Han S. T., Rouster-Stevens K. A., Hersh A. O., Vogler L. B., Bohnsack J. F., Abramowicz S., Mikuls T. R., & Prahalad S. Symptoms of periodontitis and antibody responses to *Porphyromonas gingivalis* in juvenile idiopathic arthritis. *Pediatric rheumatology online journal*. 2016. Vol. 14 (1), 8. DOI: <https://doi.org/10.1186/s12969-016-0068-6>.
 30. Miranda L. A., Fischer R. G., Sztajn bok F. R., Johansson A., Figueredo C. M., & Gustafsson A. Increased interleukin-18 in patients with juvenile idiopathic arthritis and early attachment loss. *Journal of periodontology*. 2005. Vol. 76 (1). P. 75–82. DOI: <https://doi.org/10.1902/jop.2005.76.1.75>.
 31. Joosten L. A., Radstake T. R., Lubberts E., van den Bersselaar L. A., van Riel P. L., van Lent P. L., Barrera P., & van den Berg W. B. Association of interleukin-18 expression with enhanced levels of both interleukin-1beta and tumor necrosis factor alpha in knee synovial tissue of patients with rheumatoid arthritis. *Arthritis and rheumatism*. 2003. Vol. 48 (2). P. 339–347. DOI: <https://doi.org/10.1002/art.10814>.
 32. Rouabhia M., Ross G., Pagé N., & Chakir J. Interleukin-18 and gamma interferon production by oral epithelial cells in response to exposure to *Candida albicans* or lipopolysaccharide stimulation. *Infection and immunity*. 2002. Vol. 70 (12). P. 7073–7080. DOI: <https://doi.org/10.1128/IAI.70.12.7073-7080.2002>.
 33. Miranda L. A., Braga F., Fischer R. G., Sztajn bok F. R., Figueredo C. M., & Gustafsson A. Changes in periodontal and rheumatological conditions after 2 years in patients with juvenile idiopathic arthritis. *Journal of periodontology*. 2006. Vol. 77 (10). P. 1695–1700. DOI: <https://doi.org/10.1902/jop.2006.060113>.
 34. Silva T. L., Braga F. S., Sztajn bok F. R., Souza A. A., Silva F. de B., Fischer R. G., & Figueredo C. M. Reduction in alveolar bone density of patients with juvenile idiopathic arthritis. *Revista brasileira de reumatologia*. 2012. Vol. 52 (1). P. 38–43.
 35. Kobus A., Bagińska J., Łapińska-Antończuk J., Ławicki S., & Kierklo A. Levels of Selected Matrix Metalloproteinases, Their Inhibitors in Saliva, and Oral Status in Juvenile Idiopathic Arthritis Patients vs. Healthy Controls. *BioMed research international*. 2019. 7420345. DOI: <https://doi.org/10.1155/2019/7420345>.
 36. Pugliese C., van der Vinne R. T., Campos L. M., Guardieiro P. R., Saviolli C., Bonfá E., Pereira R. M., Viana V. S., Borba E. F., & Silva C. A. Juvenile idiopathic arthritis activity and function ability: deleterious effects in periodontal disease? *Clinical rheumatology*. 2016. Vol. 35 (1). P. 81–91. DOI: <https://doi.org/10.1007/s10067-015-3125-5>.

References

1. Kapila, Y.L. (2021). Oral health's inextricable connection to systemic health: Special populations bring to bear multimodal relationships and factors connecting periodontal disease to systemic diseases and conditions. *Periodontology* 2000, 87 (1), 11–16. DOI: <https://doi.org/10.1111/prd.12398>.
2. Natarajan, P., Madanian, S., & Marshall, S. (2025). Investigating the link between oral health conditions and systemic diseases: A cross-sectional analysis. *Scientific reports*, 15 (1), 10476. DOI: <https://doi.org/10.1038/s41598-025-92523-6>.
3. D'Aiuto, F., Suvan, J., Siripaiboonpong, N., Gatzoulis, M.A., & D'Aiuto, F. (2025). The root of the matter: Linking oral health to chronic diseases prevention. *International journal of cardiology. Congenital heart disease*, 19, 100574. DOI: <https://doi.org/10.1016/j.ijcchd.2025.100574>.
4. Kovalenko, V.M., Shuba, N.M., Yaremenko, O.B., Omelchenko, L.I., Bortkevych, O.P., Marushko, T.V., Procenko, G.O., Garmish, O.O., Ter-Vartanyan, S.H., Svyntsiyskiy, A.S., & Gerasymenko, S.I. (2016). Diskusiyne pytannya obgruntuvannia statusu diagnozu "yuvnilniy revmatoidniy artryt" v kategorii doroslogo naselennia u vypadkakh debiutu hvoroby v dityachomu ta pidlitkovomu vitsi [Substantiation report concerning retention of diagnosis "juvenile rheumatoid arthritis" status in adult patients with a disease onset in childhood and adolescence]. *Ukrayinskiy revmatologichnyi zhurnal*, (1), 21–24 [in Ukrainian].
5. D'Aiuto, F., Suvan, J., Siripaiboonpong, N., Gatzoulis, M.A., & D'Aiuto, F. (2025). The root of the matter: Linking oral health to chronic diseases prevention. *International journal of cardiology. Congenital heart disease*, 19, 100574. DOI: <https://doi.org/10.1016/j.ijcchd.2025.100574>.
6. Kaskova, L., Morhun, N., Yanko, N., Vashchenko, I., Khmil, O., & Andryanova, O. (2025). Problema cariesu tymchasovych zubiv u ditei (ogliad literaturi) [Problem of caries in primary teeth at children (literature review)]. *Ukrainian Dental Almanac*, (1), 71–77. DOI: <https://doi.org/10.31718/2409-0255.1.2025.12> [in Ukrainian].
7. Pedersen, A.M.L. (2016). Oral Infections and General Health. Springer Cham. DOI: <https://doi.org/10.1007/978-3-319-25091-5>.
8. Liu, X., Xu, J., Li, S., Wang, X., Liu, J., & Li, X. (2022). The prevalence of gingivitis and related risk factors in schoolchildren aged 6–12 years old. *BMC oral health*, 22 (1), 623. DOI: <https://doi.org/10.1186/s12903-022-02670-9>.
9. Elgasmí, F.E., Maghous, K., & Badre, B. (2025). Gingivitis in children and adolescents: epidemiological overview and associated factors-A narrative review. *Frontiers in oral health*, 6, 1675033. DOI: <https://doi.org/10.3389/froh.2025.1675033>.

10. Holubieva, I., Kolenko, J., Khomenko, L., Ostapko, O., Semenova, I., & Voronina, I. (2024) Local Risk Factors in the Development of Periodontal Diseases in Children and Adolescents. *Bulletin of Stomatology and Maxillofacial Surgery*, 20 (1), 139–149. DOI: <https://doi.org/10.58240/1829006X-2024.1-139>.
11. Leksell, E., Ernberg, M., Magnusson, B. & Hedenberg-Magnusson, B. (2008), Intraoral condition in children with juvenile idiopathic arthritis compared to controls. *International Journal of Paediatric Dentistry*, 18, 423–433. DOI: <https://doi.org/10.1111/j.1365-263X.2008.00931.x>.
12. Kulygina, V.M., Pylypiuk, O.Y., Turchyn, I.V., Gadzhula, N.G., Shinkaruk-Dykovytska, M.M., Povsheniuk, A.V., & Kovalchuk, L.O. (2023). A study of the influence of juvenile adjuvant arthritis on dental hard tissues condition in experimental animals. *Wiadomosci lekarskie* (Warsaw, Poland: 1960), 76 (11), 2383–2388. DOI: <https://doi.org/10.36740/WLek202311107>.
13. Pylypyuk, O.Y. (2019). Obruntuвання комплексної профілактики і лікування карієсу у дітей з ювенільним ревматоїдним артритом [Substantiation of complex preventive measures and treatment of dental caries in children with juvenile rheumatoid arthritis]. *PhD dissertation (Dentistry)*. State University “Uzhhorod National University”, Uzhhorod [in Ukrainian].
14. Pylypiuk, O.Y., Kulygina, V.M., Shinkaruk-Dykovytska, M.M., Aleksyeyenko, N.S., & Vakhovskiy, V.V. (2020). Rezultaty klinichnogo stomatologichnogo obstezhennia ditey prepupertatnogo i pubertatnogo viku z yuvenilnim revmatoidnym artrytom [The results of a clinical dental examination of children of prepubertal and pubertal age with juvenile rheumatoid arthritis]. *Bulletin of problems in biology and medicine*, 4, 365–369. DOI: <https://doi.org/10.29254/2077-4214-2020-4-158-365-369> [in Ukrainian].
15. Welbury, R.R., Thomason, J.M., Fitzgerald, J.L., Steen, I.N., Marshall, N.J., & Foster, H.E. (2003). Increased prevalence of dental caries and poor oral hygiene in juvenile idiopathic arthritis. *Rheumatology (Oxford, England)*, 42 (12), 1445–1451. DOI: <https://doi.org/10.1093/rheumatology/keg395>.
16. Savioli, C., Silva, C.A., Ching, L.H., Campos, L.M., Prado, E.F., & Siqueira, J.T. (2004). Dental and facial characteristics of patients with juvenile idiopathic arthritis. *Revista do Hospital das Clinicas*, 59 (3), 93–98. DOI: <https://doi.org/10.1590/s0041-87812004000300001>.
17. Santos, D., Silva, C., & Silva, M. (2015). Oral health and quality of life of children and adolescents with juvenile idiopathic arthritis according to their caregivers' perceptions. *Special care in dentistry: official publication of the American Association of Hospital Dentists, the Academy of Dentistry for the Handicapped, and the American Society for Geriatric Dentistry*, 35 (6), 272–278. DOI: <https://doi.org/10.1111/scd.12129>.
18. Gil, E.G., Åström, A.N., Lie, S.A., Rygg, M., Fischer, J., Rosén, A., Bletsa, A., Luukko, K., Shi, X.Q., Halbig, J., Frid, P., Cetrelli, L., Tylleskär, K., Rosendahl, K., & Skeie, M.S. (2021). Dental caries in children and adolescents with juvenile idiopathic arthritis and controls: a multilevel analysis. *BMC oral health*, 21 (1), 417. DOI: <https://doi.org/10.1186/s12903-021-01758-y>.
19. Çalıřkan, C., Durmuş, B., Yıldırım, H.S., Demir, F., & Sözeri, B. (2023) Comparison of Oral Health and Salivary Biomarkers in Children with Juvenile Idiopathic Arthritis and Healthy Individuals. *Nigerian Journal of Clinical Practice*, 26 (12), 1808–1816. DOI: https://doi.org/10.4103/njcp.njcp_169_23.
20. Feres de Melo, A.R., Ferreira de Souza, A., de Oliveira Perestrelo, B., & Leite, M.F. (2014). Clinical oral and salivary parameters of children with juvenile idiopathic arthritis. *Oral surgery, oral medicine, oral pathology and oral radiology*, 117 (1), 75–80. DOI: <https://doi.org/10.1016/j.oooo.2013.08.024>.
21. Kobus, A., Bagińska, J., Łapińska-Antończuk, J., Ławicki, S., & Kierklo, A. (2019). Levels of Selected Matrix Metalloproteinases, Their Inhibitors in Saliva, and Oral Status in Juvenile Idiopathic Arthritis Patients vs. Healthy Controls. *BioMed research international*, 7420345. DOI: <https://doi.org/10.1155/2019/7420345>.
22. Pugliese, C., van der Vinne, R.T., Campos, L.M., Guardieiro, P.R., Savioli, C., Bonfá, E., Pereira, R.M., Viana, V.S., Borba, E.F., & Silva, C.A. (2016). Juvenile idiopathic arthritis activity and function ability: deleterious effects in periodontal disease? *Clinical rheumatology*, 35 (1), 81–91. DOI: <https://doi.org/10.1007/s10067-015-3125-5>.
23. Merle, C.L., Hoffmann, R., Schmickler, J., Rühlmann, M., Challakh, N., Haak, R., Schmalz, G., & Ziebolz, D. (2020). Comprehensive Assessment of Orofacial Health and Disease Related Parameters in Adolescents with Juvenile Idiopathic Arthritis-A Cross-Sectional Study. *Journal of clinical medicine*, 9 (2), 513. DOI: <https://doi.org/10.3390/jcm9020513>.
24. Greulich, S., Lee, P., Leroux, B., Ringold, S., Darveau, R., Henstorf, G., Berg, J., Kim, A., Velan, E., Kelly, J., Baltuck, C., Reeves, A., Leahey, H., Hager, K., Brittnacher, M., Hayden, H., Miller, S., McLean, J., & Stevens, A. (2019). Oral health and plaque microbial profile in juvenile idiopathic arthritis. *Pediatric rheumatology online journal*, 17 (1), 81. DOI: <https://doi.org/10.1186/s12969-019-0387-5>.
25. Tang, J., Dong, L., Ran, J., Liu, Z., & Li, Y. (2023). Association between juvenile idiopathic arthritis and periodontal diseases: a systematic review and meta-analysis. *Journal of Clinical Pediatric Dentistry*, 47 (5), 19–31. DOI: <https://doi.org/10.22514/jocpd.2023.050>.
26. Gil, E.G., Åström, A.N., Lie, S.A., Rygg, M., Fischer, J., Rosén, A., Bletsa, A., Luukko, K., Shi, X.Q., Halbig, J., Frid, P., Cetrelli, L., Tylleskär, K., Rosendahl, K., & Skeie, M.S. (2023). Dental plaque and gingival bleeding in adolescents with juvenile idiopathic arthritis and controls: a multilevel analysis. *Acta odontologica Scandinavica*, 81 (1), 50–65. DOI: <https://doi.org/10.1080/00016357.2022.2078505>.
27. Ximénez-Fyvie, L.A., Haffajee, A.D., & Socransky, S.S. (2000). Comparison of the microbiota of supra- and subgingival plaque in health and periodontitis. *Journal of clinical periodontology*, 27 (9), 648–657. DOI: <https://doi.org/10.1034/j.1600-051x.2000.027009648.x>.
28. Starkhammar Johansson, C., Dimitrijevic Carlsson, A., Wahlund, K., & Alstergren, P. (2024). Periodontal Health in Children with Juvenile idiopathic arthritis. *European journal of paediatric dentistry*, 25 (1), 36–41. DOI: <https://doi.org/10.23804/ejpd.2024.1913>.
29. Lange, L., Thiele, G.M., McCracken, C., Wang, G., Ponder, L.A., Angeles-Han, S.T., Rouser-Stevens, K.A., Hersh, A.O., Vogler, L.B., Bohnsack, J.F., Abramowicz, S., Mikuls, T.R., & Prahalad, S. (2016). Symptoms of periodontitis and antibody responses to *Porphyromonas gingivalis* in juvenile idiopathic arthritis. *Pediatric rheumatology online journal*, 14 (1), 8. DOI: <https://doi.org/10.1186/s12969-016-0068-6>.
30. Miranda, L.A., Fischer, R.G., Sztajn bok, F.R., Johansson, A., Figueredo, C.M., & Gustafsson, A. (2005). Increased interleukin-18 in patients with juvenile idiopathic arthritis and early attachment loss. *Journal of*

- periodontology*, 76 (1), 75–82. DOI: <https://doi.org/10.1902/jop.2005.76.1.75>.
31. Joosten, L.A., Radstake, T.R., Lubberts, E., van den Bersselaar, L.A., van Riel, P.L., van Lent, P.L., Barrera, P., & van den Berg, W.B. (2003). Association of interleukin-18 expression with enhanced levels of both interleukin-1beta and tumor necrosis factor alpha in knee synovial tissue of patients with rheumatoid arthritis. *Arthritis and rheumatism*, 48 (2), 339–347. DOI: <https://doi.org/10.1002/art.10814>.
 32. Rouabhia, M., Ross, G., Pagé, N., & Chakir, J. (2002). Interleukin-18 and gamma interferon production by oral epithelial cells in response to exposure to *Candida albicans* or lipopolysaccharide stimulation. *Infection and immunity*, 70 (12), 7073–7080. DOI: <https://doi.org/10.1128/IAI.70.12.7073-7080.2002>.
 33. Miranda, L.A., Braga, F., Fischer, R.G., Sztajn bok, F.R., Figueredo, C. M., & Gustafsson, A. (2006). Changes in periodontal and rheumatological conditions after 2 years in patients with juvenile idiopathic arthritis. *Journal of periodontology*, 77 (10), 1695–1700. DOI: <https://doi.org/10.1902/jop.2006.060113>.
 34. Silva, T.L., Braga, F.S., Sztajn bok, F.R., Souza, A.A., Silva, F. de B., Fischer, R.G., & Figueredo, C.M. (2012). Reduction in alveolar bone density of patients with juvenile idiopathic arthritis. *Revista brasileira de reumatologia*, 52 (1), 38–43.
 35. Kobus, A., Bagińska, J., Łapińska-Antończuk, J., Ławicki, S., & Kierklo, A. (2019). Levels of Selected Matrix Metalloproteinases, Their Inhibitors in Saliva, and Oral Status in Juvenile Idiopathic Arthritis Patients vs. Healthy Controls. *BioMed research international*, 7420345. DOI: <https://doi.org/10.1155/2019/7420345>.
 36. Pugliese, C., van der Vinne, R.T., Campos, L.M., Guardieiro, P.R., Saviolli, C., Bonfá, E., Pereira, R.M., Viana, V.S., Borba, E.F., & Silva, C.A. (2016). Juvenile idiopathic arthritis activity and function ability: deleterious effects in periodontal disease? *Clinical rheumatology*, 35 (1), 81–91. DOI: <https://doi.org/10.1007/s10067-015-3125-5>.