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Comprehensive Treatment of Patients with Chronic Catarrhal Gingivitis Living in Environmentally Unfavorable Conditions

▷ **Background:** Chronic catarrhal gingivitis (CCG) in children is influenced by environmental pollution, psycho-emotional stress, and functional impairments in breathing and swallowing. These factors contribute to persistent inflammation and impaired oral hygiene.

Objective: To evaluate the effectiveness of comprehensive therapy—including professional oral hygiene, local treatment, and labial-myofunctional rehabilitation using the Froggy Mouth appliance—on periodontal health, breathing patterns, and swallowing function in children living in environmentally unfavorable conditions.

Materials and Methods: A total of 120 children aged 12–15 years with CCG were examined and divided into four groups based on their residential environment and treatment protocol. Functional breathing assessment, evaluation of atypical swallowing, and cytomorphometric analysis of periodontal tissues were performed at baseline and during follow-up. Labial-myofunctional therapy using the Froggy Mouth appliance was implemented following adenoidectomy. Local pharmacological therapy was administered according to group assignments.

Results: Children residing in environmentally unfavorable regions exhibited higher levels of psycho-emotional stress, poor oral hygiene, and more pronounced cytomorphometric indicators of periodontal inflammation. Functional disorders, including mouth breathing and atypical swallowing, were closely associated with II and IV occlusal patterns. Comprehensive therapy led to a progressive normalization of cytomorphometric parameters and the restoration of functional swallowing skills within a 20–25 week period.

Conclusions: CCG in children is significantly exacerbated by stress and environmental factors. Effective management requires an interdisciplinary approach, integrating dental care, ENT intervention, and myofunctional therapy. The Froggy Mouth appliance proved highly effective in restoring swallowing function and improving periodontal health in high-risk pediatric populations.

Keywords: *stress; environmentally unfavorable conditions; cytomorphometry; breathing pattern; atypical swallowing; Froggy Mouth appliance.*

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Statement of the problem

Children residing in environmentally unfavorable regions of Ukraine, which are additionally affected by armed conflict, experience chronic psycho-emotional and physiological stress. The synergistic effects of air pollution, stressors, and limited access to preventive healthcare create conditions conducive to respiratory dysfunction and secondary dental complications [1, 14, 18]. According to the World Health Organization [18] and Schraufnagel et al. [14], prolonged exposure to polluted air leads to chronic inflammation of the upper respiratory tract mucosa. In children, this manifests as frequent rhinitis, adenoiditis, and persistent impairment of nasal breathing [4, 6]. Under conditions of war-related stress, these processes are exacerbated by immune dysregulation, which promotes adenoid hypertrophy and the development of mouth breathing [2, 10, 11]. Furthermore, studies indicate that psycho-emotional stress in children is associated with altered autonomic regulation, reduced salivary secretion, and behavioral shifts, including decreased motivation for oral hygiene maintenance [1, 5, 7]. During wartime, parental attention is often prioritized toward safety and social stability, which frequently leads to the neglect of children's oral hygiene practices [12, 15]. Mouth breathing, commonly observed in children

with adenoid hypertrophy, results in oral mucosal dryness, compromised salivary self-cleaning, and the rapid accumulation of dental plaque [1, 3, 9]. These conditions predispose patients to the development of chronic catarrhal gingivitis, early-stage periodontitis, and gingival bleeding [1, 9]. Ukrainian researchers have reported that children residing in industrial and environmentally burdened regions exhibit a higher prevalence of poor oral hygiene, chronic gingivitis, and early dystrophic changes in periodontal tissues [12]. The convergence of environmental stressors, war-related trauma, and respiratory disorders creates a vicious cycle, complicating the prevention and treatment of dental diseases [1, 5, 7, 10]. Consequently, children in environmentally polluted areas of Ukraine under the conditions of armed conflict constitute a high-risk group for respiratory dysfunction, mouth breathing, inadequate oral hygiene, and inflammatory periodontal changes [1, 4, 14, 18]. These findings underscore the critical need for an interdisciplinary approach that integrates medical, psychological, and social factors [2, 5, 7, 10].

Research Methods

A total of 345 children were initially screened for this clinical study. From this cohort, 120 patients diagnosed with chronic catarrhal gingivitis (CCG) and comorbid ENT disorders were selected for further investigation. The study population was divided into two geographical groups: 60 children residing in environmentally unfavorable conditions (Burshtyn, Ivano-Frankivsk region) and 60 children living in Ivano-Frankivsk city, which served as the comparative urban environment.

Inclusion criteria:

- Age between 12 and 15 years;
- Normal lingual frenulum (normal tongue-tie status);
- Presence of mouth breathing or habitual (hidden) mouth breathing.

Exclusion criteria:

- Age under 12 or over 15 years;
- Facial asymmetries associated with genetic syndromes;
- History of craniofacial trauma (e.g., skull fractures).

Statistical Analysis and Data Presentation

Descriptive statistics were presented as absolute numbers and percentages. To compare proportions between independent groups, the chi-square test was applied, while the paired proportion test was used for longitudinal comparisons within groups. All statistical analyses and graphical representations to illustrate data distribution were performed using R software (version 4.0; R Foundation for Statistical Computing, Vienna, Austria; https://www.R-project.org).

Treatment Methods

A total of 120 patients aged 12–15 years, diagnosed with chronic catarrhal gingivitis (CCG) and concurrent nasal breathing impairments, were enrolled in the study. Based on the specific pharmacological intervention applied to the periodontal tissues, the participants were divided into two primary treatment groups.

- ***Group 1 (n = 60):*** Patients in this group received comprehensive treatment incorporating the proposed local therapy. Oral rinsing was performed with a 0.12% chlorhexidine dental elixir for 5 minutes once daily over a 10-day period. Following the rinse, a quercetin gel (prepared by dissolving 2 g of quercetin in warm water) was applied using a custom-fitted dento-gingival tray for 20 minutes once daily for 10 days.
- ***Group 2 (n = 60):*** Patients in this group received standard treatment. Oral rinsing was performed once daily for 10 days using a 0.12% chlorhexidine dental elixir, followed by a 10-day course of once-daily rinsing with a calendula and chamomile decoction. Applications of 1% mefenamic acid paste were administered using a custom-fitted dento-gingival tray for 20 minutes once daily over a 10-day period.

All patients in both groups underwent professional oral hygiene using the Air Flow system as a baseline procedure. Participants were then stratified based on their place of residence into study and control subgroups, resulting in the following distribution:

- ***Subgroup 1A (n = 30):*** Children from Ivano-Frankivsk receiving the proposed local therapy (Quercetin).
- ***Subgroup 1B (n = 30):*** Children from environmentally unfavorable conditions (Burshtyn) receiving the proposed local therapy (Quercetin).
- ***Subgroup 2A (n = 30):*** Children from Ivano-Frankivsk receiving standard treatment (Mefenamic acid).
- ***Subgroup 2B (n = 30):*** Children from environmentally unfavorable conditions (Burshtyn) receiving standard treatment (Mefenamic acid).

The control group was similarly subdivided based on environmental conditions to establish baseline values for healthy individuals:

- ***Control Group K1 (n = 15):*** Children from Ivano-Frankivsk with an intact periodontium and no history of ENT pathology.
- ***Control Group K2 (n = 20):*** Children from environmentally unfavorable conditions (Burshtyn) with

an intact periodontium and no history of ENT pathology.

All participants received myofunctional therapy using the Froggy Mouth appliance following the surgical removal of a hypertrophied pharyngeal tonsil (adenoidectomy). Written *informed consent* was obtained from the parents or *legal guardians* of all participants for their children's involvement in both the clinical and laboratory components of the study.

Results and Discussion

The primary clinical complaints reported by patients included gingival discomfort, halitosis, pain during the consumption of hard foods, and gingival bleeding. Beyond physical symptoms, the emotional state of the patients was identified as a critical factor. Children in Ukraine currently endure profound psycho-emotional and physiological stress due to the ongoing armed conflict, the constant fear of displacement or loss of family, and the disruption caused by frequent air raid alerts [2, 10, 11]. Such stressors often lead to the neglect of personal oral hygiene for various age-related and psychological reasons [5, 7]. Furthermore, the hormonal and emotional shifts characteristic of puberty are significantly exacerbated by wartime conditions, particularly for those residing in close proximity to strategic industrial facilities [10, 12]. All participants underwent anxiety testing using the State-Trait Anxiety Inventory (STAI) according to Spielberger, alongside a custom-designed survey regarding oral hygiene practices [5, 7, 10]. The results demonstrated that all children in Groups 1B and 2B (Burshtyn) exhibited anxiety scores exceeding 50 points, indicating a high level of anxiety. In contrast, children in Groups 1A and 2A (Ivano-Frankivsk) had an average score of 44 points, representing the upper threshold of moderate anxiety. These significant disparities were directly associated with the patients' place of residence; children in Groups 1B and 2B resided in Burshtyn, an area containing strategic infrastructure and subject to frequent attacks [2, 10].

Survey Results (Groups 1A and 2A): The assessment of oral health behaviors revealed significant discrepancies between perceived hygiene and actual practice. Among the 60 participants in these groups, 55 children (91.7%) reported experiencing chronic stress. Notably, 39 patients (65.0%) considered daily oral hygiene to be unnecessary, reflecting a low level of health motivation. While 50 children (83.3%) reported brushing their teeth twice daily and 10 children (16.7%) once daily, the quality of these efforts was poor: in 46 patients (76.7%), the duration of individual oral hygiene procedures was limited to only 20–30 seconds. Regarding interdental cleaning, 20 children (33.3%) were familiar with dental floss but used it only occasionally, while 15 children (25.0%) utilized an oral irrigator on a daily basis [5, 7].

Survey Results (Groups 1B and 2B): In the cohorts from environmentally unfavorable conditions, the behavioral patterns of oral hygiene were further compromised. An overwhelming majority of 57 children (95.0%) reported living under chronic stress. Correspondingly, a higher proportion of participants (42 patients, 70.0%) expressed the belief that daily oral hygiene was unnecessary. While 42 children (70.0%) adhered to twice-daily brushing and 18 children (30.0%) brushed once daily, the efficiency remained critically low: in 51 patients (85.0%), oral hygiene procedures lasted only 20–30 seconds. Furthermore, the use of auxiliary hygiene tools was minimal; only 15 children (25.0%) utilized dental floss occasionally, and a mere 9 children (15.0%) reported the daily use of an oral irrigator [5, 7].

The clinical assessment commenced with an extraoral evaluation, with a primary focus on the perioral region. Among the children in Groups 1A and 2A, 23 individuals (38.3%) exhibited pathological lip changes, including the presence of crusts, fissures, angular cheilitis, and maceration. In contrast, the prevalence of these alterations was significantly higher in Groups 1B and 2B, where 35 patients (58.3%) showed similar perioral manifestations [1, 3, 9].

Clinical evaluation confirmed the presence of nasal breathing disorders in all selected patients. In Group 1A, 23 patients (76.7%) exhibited overt mouth breathing, while 7 (23.3%) presented with habitual (hidden) mouth breathing. In Group 2A, overt mouth breathing was observed in 19 patients (63.3%), with habitual mouth breathing identified in 11 (36.7%). Similarly, in Group 1B, overt mouth breathing was present in 21 patients (70.0%) and habitual mouth breathing in 9 (30.0%). In Group 2B, overt mouth breathing occurred in 22 patients (73.3%), while 8 (26.7%) exhibited habitual mouth breathing [1, 3, 4, 6].

Atypical swallowing was diagnosed in 12 patients (40.0%) in Group 1A and 14 patients (46.7%) in Group 2A. In contrast, a markedly higher prevalence was observed in the industrial cohorts: 21 patients (70.0%) in Group 1B and 22 patients (73.3%) in Group 2B. Occlusal patterns associated with atypical swallowing were classified according to established types [3, 5, 7]:

- **Group 1A:** 9 patients presented with Type II and 3 with Type IV occlusal patterns.
- **Group 2A:** 1 patient exhibited Type IB, 5 patients Type II, 2 patients Type III, and 6 patients Type IV.
- **Group 1B:** 7 patients had Type II, 2 had Type III, 11 had Type IV, and 1 had Type V.

- **Group 2B:** 2 patients showed Type IB, 6 had Type II, 12 had Type IV, and 2 had Type V [3, 5].

Notably, Type II occlusion, characterized by malocclusion extending from molar to molar due to tongue interposition between the dental arches, was a frequent finding across all groups.

In Type II cases, the tongue functions simultaneously as a sagittal driving force and a vertical obstacle. Masticatory muscle tone is significantly reduced due to incomplete dental closure, a direct consequence of tongue interposition within the posterior-lateral segments. The orbicularis oris muscle is similarly compromised, leading to insufficient lip seal during deglutition. Conversely, the mentalis muscle exhibits compensatory hyperactivity, which is necessary to achieve an anterior seal during swallowing [3, 5, 7].

Type IV occlusion is characterized by bidental protrusion. In this pattern, abnormal tongue pressure against the palatal surfaces of the upper and lower incisors acts as a potent driving force, inducing the vestibular inclination of the anterior teeth. While masticatory muscles typically maintain normal tone (with hypertonicity occurring only during posterior occlusal contact), the orbicularis oris muscle remains weakened. This lack of labial resistance allows the tongue pressure to remain unopposed, while the mentalis muscle undergoes intense contraction during the swallowing phase [3, 5, 7].

Cephalometric analysis revealed that all patients demonstrated a horizontal jaw growth pattern associated with Class II malocclusion. A characteristic double contouring of the mandible was observed, serving as a radiological indicator of a low distal tongue position, alongside the inferior displacement of the hyoid bone. Furthermore, adenoid hypertrophy was clearly visualized in all cases, leading to significantly compromised airway patency and the reinforcement of mouth-breathing patterns.

To objectively evaluate the cellular response to treatment, cytomorphometric assessment was conducted. The intensity of inflammatory-infiltrative changes in the periodontal tissues was quantified using two key metrics:

1. Inflammatory-Dystrophic Index (IDI): To assess the degree of cellular inflammation and metabolic disturbance.

2. Destruction Index (DI): To measure the extent of epithelial cell degradation and tissue damage.

Baseline cytomorphometric evaluations were performed prior to treatment, with follow-up assessments conducted at 6 and 12 months after the initiation of comprehensive therapy to track the long-term stability of the results.

In the control groups K1 and K2, characterized by an intact periodontium, a low density of cellular complexes was observed. These primarily consisted of nucleated cells from the superficial epithelial layers, exhibiting characteristic small, dense nuclei and lightly stained cytoplasm [8, 9].

In stark contrast, prior to treatment, the majority of patients with chronic catarrhal gingivitis (CCG) exhibited a high density of epithelial complexes (exceeding 10 cells per cluster). These smears contained a heterogeneous cell population, including:

- Basal cells and young squamous cells from the spinous layer (indicative of accelerated epithelial turnover);
- Nucleated cells from the superficial layer and keratinized anucleate cells.

Furthermore, the presence of segmented leukocytes, monocytes, and significant microbial inclusions (sediment) confirmed a state of active inflammation and poor oral hygiene [1, 3, 9].

Baseline IDI and DI values in groups 1A, 2A, 1B, and 2B were significantly higher than those in the control groups ($p < 0.05$) These disparities are attributed to the synergistic impact of environmental stressors, low hygiene motivation, and chronic psycho-emotional stress [7, 10, 11]. During the stages of comprehensive therapy, a progressive normalization of cytomorphometric parameters was observed across all study groups. This shift indicates a reduction in inflammatory-infiltrative processes and the restoration of periodontal tissue integrity. The results underscore that the presence of chronic inflammation in these patients requires early, interdisciplinary management, particularly for children exposed to the dual burden of environmental and wartime stressors [1, 8, 9, 10].

Myofunctional Therapy Following Adenoidectomy

All patients were referred for scheduled adenoidectomy. Following clinical recovery, participants initiated a specialized myofunctional therapy protocol using the Froggy Mouth appliance. This intervention is based on the principle that surgical adenoid removal alone does not guarantee the normalization of tongue posture or the spontaneous elimination of overt or habitual (hidden) mouth breathing.

A standardized labial therapy protocol was applied to all patients across both study groups. The progression of functional recovery was objectively assessed by monitoring the stages of swallowing development (S0–S2) at 5-week intervals, allowing for a precise evaluation of the transition from visceral to somatic deglutition.

Week 5: At Stage 0 (S0), 83.3% ($^{25}/_{30}$) of Group 1A, 93.3% ($^{28}/_{30}$) of Group 1B, 80.0% ($^{24}/_{30}$) of Group 2A, and 96.7% ($^{29}/_{30}$) of Group 2B were at S0. Stage 1 was achieved by 16.7% ($^{5}/_{30}$) of Group 1A,

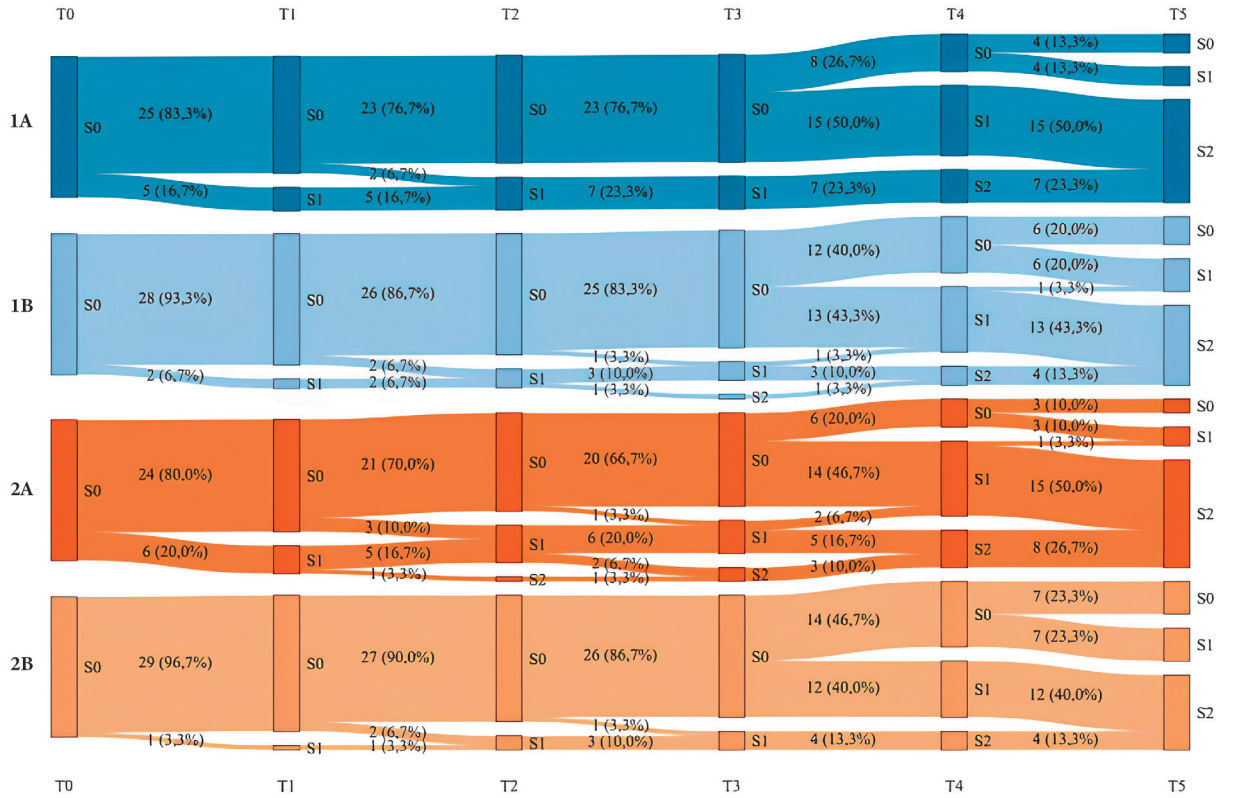

Fig. 1. Transition of patients with atypical swallowing across different stages of treatment.
Notes: T0 — baseline observation time; T1 — observation time after 5 weeks; T2 — observation time after 10 weeks; T3 — observation time after 15 weeks; T4 — observation time after 20 weeks; T5 — observation time after 25 weeks; 1A, 1B, 2A, 2B — groups of patients; S0, S1, S2 — rehabilitation stages.
• — statistical significance ($p < 0.05$).

6.7% ($^{2}/_{30}$) of Group 1B, 20.0% ($^{6}/_{30}$) of Group 2A, and 3.3% ($^{1}/_{30}$) of Group 2B.

Week 10: At S0, 76.7% ($^{23}/_{30}$) of Group 1A, 86.7% ($^{26}/_{30}$) of Group 1B, 70.0% ($^{21}/_{30}$) of Group 2A, and 90.1% ($^{27}/_{30}$) of Group 2B remained. Stage 1 was reached by 23.3% ($^{7}/_{30}$) of Group 1A, 13.3% ($^{4}/_{30}$) of Group 1B, 26.7% ($^{8}/_{30}$) of Group 2A, and 10.0% ($^{3}/_{30}$) of Group 2B. One patient (3.3%) in Group 2A achieved automated swallowing skills and progressed to Stage 2.

Week 15: At S0, 76.7% ($^{23}/_{30}$) of Group 1A, 83.3% ($^{25}/_{30}$) of Group 1B, 66.7% ($^{20}/_{30}$) of Group 2A, and 66.7% ($^{26}/_{30}$) of Group 2B remained. Stage 1 was reached by 23.3% ($^{7}/_{30}$) of Group 1A, 13.4% ($^{4}/_{30}$) of Group 1B, 23.4% ($^{7}/_{30}$) of Group 2A, and 33.3% ($^{4}/_{30}$) of Group 2B. One patient (3.3%) in Group 1B and 3 patients (10.0%) in Group 2A progressed to Stage 2.

Week 20: At S0, 26.7% (8/30) of Group 1A, 40.0% ($^{12}/_{30}$) of Group 1B, 20.0% ($^{6}/_{30}$) of Group 2A, and 46.8% ($^{14}/_{30}$) of Group 2B remained. Stage 1 was reached by 50.0% ($^{15}/_{30}$) of Group 1A, 46.7% ($^{14}/_{30}$) of Group 1B, 53.3% ($^{16}/_{30}$) of Group 2A, and 40.0% ($^{12}/_{30}$) of Group 2B. Stage 2 was achieved by 23.3% ($^{7}/_{30}$) of Group 1A, 13.3% ($^{4}/_{30}$) of Group 1B, 26.7% ($^{8}/_{30}$) of Group 2A, and 13.2% ($^{4}/_{30}$) of Group 2B.

Week 25: At S0, 13.2% ($^{4}/_{30}$) of Group 1A, 20.0% ($^{6}/_{30}$) of Group 1B, 10.0% ($^{3}/_{30}$) of Group 2A, and 23.3% ($^{7}/_{30}$) of Group 2B remained. Stage 1 was reached by 13.2% ($^{4}/_{30}$) of Group 1A, 23.3% ($^{7}/_{30}$) of Group 1B, 13.2% ($^{4}/_{30}$) of Group 2A, and 23.3% ($^{7}/_{30}$) of Group 2B. Stage 2 (automated swallowing) was achieved by 73.6% ($^{22}/_{30}$) of Group 1A, 56.7% ($^{17}/_{30}$) of Group 1B, 76.9% ($^{23}/_{30}$) of Group 2A, and 53.4% ($^{16}/_{30}$) of Group 2B.

The results of our study regarding the timeline for achieving functional swallowing stages through labial myofunctional therapy are consistent with recent findings by Makhlynets N. (2025) [8] and Makhlynets et al. (2026) [9]. In our cohort, where myofunctional intervention was initiated post-adenoidectomy, significant improvements in deglutition were observed progressively over the 25-week observation period.

By Week 10, approximately 23.3–26.7% of patients had successfully transitioned from Stage 0 (S0) to Stage 1 (S1). By Week 20, a definitive shift toward automation was noted, with 13.2–26.7% of participants reaching Stage 2 (automated swallowing). The final assessment at Week 25 revealed that the majority of patients (53.4–76.9%) demonstrated fully automated swallowing skills (Stage 2). These results indicate the successful acquisition of stable functional oral-motor patterns and underscore the necessity of a prolonged, 6-month rehabilitation protocol to ensure the permanence of the neuro-muscular transition (Figure 1).

Other authors [8] reported that undergraduate dental students undergoing stepwise labial and orofacial training with the Froggy Mouth appliance reached initial functional stabilization (Stage 1 equivalent) within 6–8 weeks, with full automation (Stage 2 equivalent) observed after approximately 20–24 weeks of consistent therapy. Similarly, Makhlynets et al. (2026) [9] observed that preschool children with oral parafunctional habits achieved automated oral-motor skills after 22–25 weeks of structured Froggy Mouth therapy, highlighting the gradual nature of neuromuscular adaptation. The timing of progression in our clinical cohort closely mirrors the periods reported by other authors, despite the additional challenges posed by post-surgical recovery and environmental stress factors in our patients. Both studies confirm that Stage 2 acquisition typically requires approximately 20–25 weeks of regular therapy, emphasizing the importance of long-term adherence to myofunctional exercises. Differences in early-stage progression (Weeks 5–15) may be attributed to the additional psycho-emotional and environmental stressors affecting our patients, such as living in areas exposed to strategic infrastructure risks and ongoing conflict, which can influence compliance and neuromuscular adaptation. Overall, the convergence of results supports the efficacy of Froggy Mouth-assisted labial therapy in normalizing tongue posture, improving oral breathing, and facilitating functional swallowing, consistent across both preschool and adolescent populations [8, 9].

Conclusions

1. Chronic catarrhal gingivitis in children is associated with significant inflammatory-infiltrative changes in the gingival tissues, which are clearly reflected in cytomorphometric parameters, including increased inflammatory-dystrophic and destruction indices compared to the control group ($p < 0.05$) [8, 9].

2. Environmental and psycho-emotional factors play a decisive role in disease severity: children living in ecologically unfavorable conditions and under chronic social stress demonstrate higher levels of anxiety, poorer oral hygiene habits, and more pronounced cytomorphometric alterations in periodontal tissues [1, 7, 10].

3. Functional disorders, such as mouth breathing and atypical swallowing, are common in children with chronic catarrhal gingivitis (CCG), with Class II and IV occlusal patterns being the most frequently observed. These disorders contribute to the persistence of periodontal inflammation and necessitate early interceptive correction [8, 9].

4. Comprehensive therapy—incorporating professional oral hygiene, targeted topical treatment (Chlorhexidine and Quercetin applications), and myofunctional rehabilitation using the Froggy Mouth appliance following adenoidectomy—resulted in the gradual normalization of cytomorphometric parameters, restoration of functional swallowing patterns, and significant improvement in oral hygiene over a 25-week period [8, 9].

5. These results highlight the importance of interdisciplinary management for children with chronic catarrhal gingivitis (CCG). Combining dental, ENT, and psychological interventions is particularly crucial for populations exposed to environmental pollution and psycho-emotional stressors, ensuring a holistic approach to periodontal health.

Conflict of interest

The authors declare no conflict of interest.

Consent to publication

The authors have given their consent to the publication of the manuscript.

Use of Artificial Intelligence

The authors state that no artificial intelligence was used in the writing of the article.

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Комплексне лікування пацієнтів на хронічний катаральний гінгівіт, які проживають в екологічно несприятливих умовах

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Актуальність. Хронічний катаральний гінгівіт (ХКГ) у дітей часто розвивається на тлі поєднаного впливу техногенного навантаження, хронічного психоемоційного стресу та дисфункцій дихання й ковтання. Зазначені чинники зумовлюють тривалу персистенцію запального процесу та суттєво ускладнюють підтримання належного рівня гігієни ротової порожнини.

Мета дослідження: Оцінити ефективність комплексної терапії, що включає професійну гігієну ротової порожнини, місцеве лікування та лабіо-міофункціональну реабілітацію за допомогою апарату Froggy Mouth, щодо стану тканин пародонта, типу дихання та функції ковтання у дітей, які проживають в екологічно несприятливих умовах.

Матеріали та методи. Обстежено 120 дітей віком 12–15 років із ХКГ, яких було розподілено на чотири групи залежно від місця проживання та методики лікування. Проведено оцінку функціонального дихання, виявлення атипового ковтання та цитоморфометричний аналіз тканин пародонта до лікування та на контрольних етапах. Лабіо-міофункціональна терапія апаратом *Froggy Mouth* проводилася після аденотомії (видалення гіпертрофованого глоткового мигдалика). Місцева фармакологічна терапія призначалася відповідно до протоколу лікування кожної групи.

Результати. У дітей, які проживають в екологічно несприятливих регіонах, виявлено вищий рівень психоемоційного стресу, гірший стан гігієни ротової порожнини та більш виражені цитоморфометричні показники запалення тканин пародонта. Функціональні порушення дихання та атипове ковтання були тісно пов'язані з II та

IV класами оклюзійних аномалій. Застосування комплексної терапії сприяло поступовій нормалізації цитоморфометричних показників та відновленню фізіологічної функції ковтання протягом 20–25 тижнів.

Висновки. Перебіг ХКГ у дітей обтяжується впливом хронічного психоемоційного стресу та несприятливих екологічних чинників. Ефективна терапія потребує міждисциплінарного підходу, що поєднує стоматологічні втручання, отоларингологічну допомогу та методи міофункціональної корекції. Застосування апарату Froggy Mouth довело свою високу ефективність у відновленні фізіологічної функції ковтання та покращенні морфо-функціонального стану тканин пародонта у пацієнтів груп високого ризику.

Ключові слова: *хронічний катаральний гінгівіт, психоемоційний стрес, екологічно несприятливі умови, цитоморфометрія, тип дихання, атипове ковтання, апарат Froggy Mouth*.

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