American Journal of Medicine and Medical Sciences 2025, 15(10): 3545-3550
DOI: 10.5923/j.ajmms.20251510.56

Optimization of Treatment and Prevention of Chronic Generalized Catarrhal Gingivitis in Patients with Bronchial Asthma

Gulnoza Tursunova[1,*], Dildora Taylakova[2]

[1]Department of Pathological Physiology, Bukhara State Medical Institute, Bukhara, Uzbekistan
[2]Department of Therapeutic Dentistry, Bukhara State Medical Institute, Bukhara, Uzbekistan

Abstract Bronchial asthma is associated with chronic inflammation and altered oral homeostasis, leading to increased susceptibility to periodontal diseases. This study evaluated the relationship between asthma and chronic generalized catarrhal gingivitis (CGCG), with a focus on the impact of inhaled corticosteroids (ICS) and the efficacy of complex therapy using mineral and osteotropic agents. A total of 144 patients were examined and divided into main, comparison, and control groups. The inclusion of mineral therapy and osteotropic agents significantly improved periodontal indices: PMA decreased by 66.7%, CPI by 61.6%, and OHI-S by 61.9% after 12 months. Correlation analysis revealed a moderate positive association between ICS dose and periodontal deterioration ($r = 0.61$). These results confirm the adverse impact of prolonged ICS use on periodontal health and highlight the importance of combined therapeutic approaches to maintain oral health in asthma patients.

Keywords Bronchial asthma, Gingivitis, Inhaled corticosteroids, Mineral therapy, Osteotropic agents

1. Introduction

According to the World Health Organization, severe periodontal disease affects approximately 19% of the global adult population, representing over one billion cases worldwide [1]. This high prevalence underscores the importance of exploring comorbidities such as bronchial asthma that may exacerbate periodontal inflammation [6,24,25].

The development of chronic generalized catarrhal gingivitis (CGCG) in patients with bronchial asthma is associated with the effects of inhaled corticosteroids (ICS), which lead to a reduction in local immunity and impairment of periodontal tissue regeneration [26–28]. This work considers the effectiveness of complex therapy, including mineral therapy and osteotropic drugs.

The study evaluated the effectiveness of such therapy compared with standard treatment. The obtained data demonstrated that additional use of mineral therapy and osteotropic medications made it possible to achieve a significant reduction in inflammation: the PMA index decreased by 66.7%, CPI by 61.6%, and OHI-S by 61.9% after 12 months of follow-up [31].

* Corresponding author:
gulnoza.tursunova@bsmi.uz (Gulnoza Tursunova)
Received: Oct. 2, 2025; Accepted: Oct. 23, 2025; Published: Oct. 28, 2025
Published online at http://journal.sapub.org/ajmms

The results show that standard therapy of CGCG in patients with bronchial asthma is not sufficiently effective. Inclusion of mineral therapy and osteotropic drugs in the treatment regimen promotes a decrease in inflammatory processes, accelerates periodontal tissue recovery, and improves oral hygiene [29–31]. Such an approach may enhance the effectiveness of dental care and improve patients' quality of life.

2. Literature Review

The relevance of studying the oral mucosa in patients with bronchial asthma is determined by the high prevalence of this disease and its systemic effects on the body [6–8]. Numerous studies confirm a strong relationship between chronic respiratory diseases and pathological changes in periodontal tissues [9,10,24,25]. Particular attention is paid to the mineral composition of oral fluid and its impact on the development of CGCG in asthmatic patients [2–5].

One of the key aspects is the level of ionized calcium in oral fluid. The study by Romanenko I.G., Kaladze K.N., and Poleshchuk O.Y. demonstrated reduced ionized calcium concentration in children with CGCG and bronchial asthma [24,25]. ICS administration was shown to reduce calcium levels in oral fluid, worsening metabolic processes in periodontal tissues [26,27]. Calcium deficiency increases vascular permeability, decreases connective tissue strength, and intensifies inflammatory changes [29].

The relationship between asthma and periodontal tissue status was also analyzed in the study by Avdeev O.V. and Vydoinyk O.Y., which revealed immunological peculiarities of inflammation in these patients [25]. The authors reported marked alterations in the oral microflora, with predominance of Porphyromonas gingivalis, Tannerella forsythia, and Prevotella intermedia [24]. Dysbiotic changes aggravate inflammation, necessitating antibacterial therapy and immunomodulatory drugs in comprehensive treatment [30,31].

In recent years, considerable attention has been paid to alternative methods of CGCG management in asthmatic patients. Kozyreva Z.K. and Gontarev S.N. demonstrated the efficacy of combined phytotherapy and sulfide mineral waters, showing improvement in gingival blood supply, reduction of inflammation, and normalization of the oral fluid mineral composition [31,32]. The use of phytotherapeutic agents partly compensates for calcium deficiency and minimizes the negative effects of long-term ICS therapy [28,29,33].

Thus, patients with bronchial asthma are at high risk of developing CGCG due to mineral metabolism disturbances, dysbiotic changes in oral microflora, and systemic inflammatory responses [24,26,29]. Current evidence supports the necessity of a complex treatment approach, including correction of salivary mineral composition, antibacterial therapy, and phytotherapy [29–31].

3. Materials and Methods

To study the relationship between bronchial asthma and CGCG, methods of clinical periodontal assessment, analysis of oral fluid mineral composition, and microbiological profiling were employed [24,25,31]. It was confirmed that asthmatic patients are at higher risk of gingival inflammatory diseases due to impaired mineral metabolism and altered oral microflora [9,10,26,29].

For objective diagnosis, clinical indices PMA, CPITN, and OHI-S were used to determine the severity of periodontal lesions and treatment needs [24,25]. Studies demonstrated that asthmatic patients exhibit higher index values compared to healthy individuals, reflecting more severe gingival inflammation and lower oral hygiene levels [6,9,10].

The mineral composition of oral fluid was assessed by ionometry, revealing a decrease in ionized calcium in asthma patients [2,3,4,5]. ICS administration reduced salivary calcium, weakening periodontal tissue resistance to inflammation [26–28].

PCR-based microbiological analysis showed increased P. gingivalis, T. forsythia, and P. intermedia in asthma patients, indicating dysbiotic changes [24,25,30]. These findings emphasize the need for a comprehensive approach combining anti-inflammatory and antibacterial therapy with mineral correction [29–31].

4. Results

The study involved 144 patients with CGCG and bronchial asthma. Patients were randomly assigned to two groups:

- **Main group (n=62):** received standard treatment plus mineral therapy and osteotropic drugs.
- **Comparison group (n=62):** received standard treatment only.
- **Control group (n=20):** healthy individuals without asthma or periodontal disease.

The mean age was 44.1±3.2 years. Groups were comparable in age and sex ($p>0.05$). All asthma patients had persistent moderate-to-severe disease and were on baseline ICS therapy.

At baseline, periodontal inflammation was more pronounced in asthmatic patients, as indicated by significantly higher PMA, CPI, and OHI-S compared to controls ($p<0.05$). No significant difference was found between the main and comparison groups initially.

Patients in the main group additionally received calcium- and phosphorus-containing gel applications twice daily for 14 days, oral calcium (1000 mg/day) and vitamin D3 (1000 IU/day) for 2 months, strengthening bone tissue and mineral metabolism. Antiseptic rinses with 0.05% chlorhexidine were prescribed for 10 days, and metronidazole-containing gel was applied for 14 days.

The comparison group underwent only standard therapy: professional oral hygiene, antiseptic rinses, and oral care recommendations.

Table 1. Baseline periodontal status (M±m)

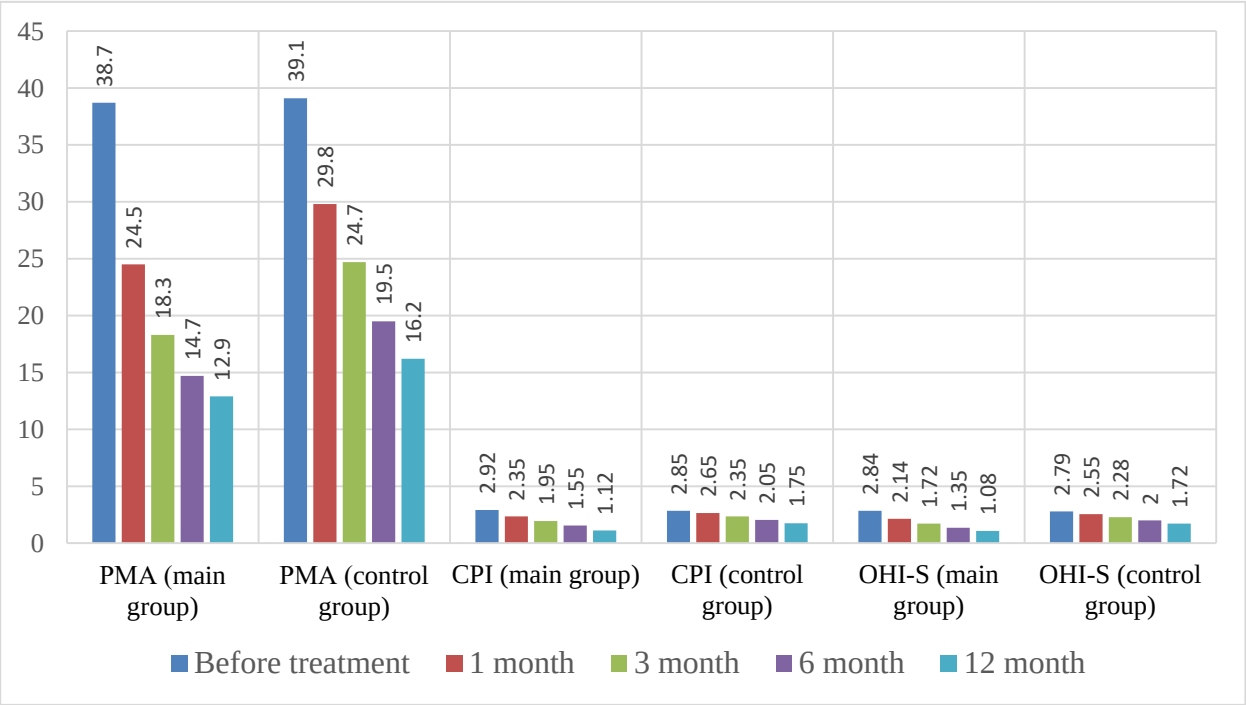
Indicator	Main group (n=62)	Comparison group (n=62)	Control group (n=20)	p
PMA index, %	38.7±3.2	39.1±3.5	12.3±2.1	<0.05
CPI, points	2.92±0.18	2.85±0.21	1.05±0.12	<0.05
OHI-S, points	2.84±0.24	2.79±0.22	1.08±0.14	<0.05

Table 2. Dynamics of dental indices after treatment (M±m)

Indicator	Before (main)	1 month	3 months	6 months	12 months
PMA index, %	38.7±3.2	24.5±2.8	18.3±2.4	14.7±2.1	12.9±2.0
CPI, points	2.92±0.18	2.35±0.16	1.95±0.14	1.55±0.12	1.12±0.10
OHI-S, points	2.84±0.24	2.14±0.20	1.72±0.18	1.35±0.14	1.08±0.12

Table 3. Correlation coefficients (r) between ICS dose and dynamics of dental indices

Time point	r (ICS dose - PMA)	r (ICS dose - CPI)	r (ICS dose – OHI-S)	p
1 month	0.45	0.42	0.39	<0.05
6 months	0.52	0.48	0.45	<0.05
12 months	0.61	0.55	0.50	<0.05



Graph 1. Development of the RMA, CPI, and OHI-S indices

After 12 months, the main group showed significant improvement: PMA decreased by 66.7%, CPI by 61.6%, and OHI-S by 61.9%. The comparison group also improved but to a lesser degree ($p<0.05$).

Correlation analysis revealed a moderate positive relationship between ICS dose and periodontal deterioration, most pronounced at 12 months: $r=0.61$ for PMA, $r=0.55$ for CPI, $r=0.50$ for OHI-S ($p<0.05$).

To assess the impact of bronchial asthma and inhalation therapy on periodontal status, a correlation analysis was performed.

The correlation analysis revealed a moderate positive relationship between the dosage of inhaled corticosteroids and the deterioration of dental indices. The strongest correlations were observed after 12 months of therapy, confirming the negative impact of long-term use of inhaled corticosteroids on periodontal tissues.

The results of the study confirmed that patients with bronchial asthma are more frequently affected by inflammatory periodontal diseases. Prolonged therapy with inhaled corticosteroids has an adverse effect on gingival condition, which necessitates a specific treatment approach. The inclusion of mineral therapy and osteotropic drugs in the treatment regimen enhances its effectiveness, reduces the severity of inflammatory processes, and improves periodontal tissue regeneration.

5. Discussion

This study revealed a significant association between bronchial asthma and periodontal inflammation. Asthmatic patients with CGCG had higher PMA ($38.7 \pm 3.2\%$), CPI (2.92 ± 0.18), and OHI-S (2.84 ± 0.24) compared to controls ($p<0.05$). This demonstrates the negative impact of asthma and ICS on periodontal tissues, likely linked to immune dysregulation and local drug effects.

Both groups improved with treatment, but patients receiving mineral therapy and osteotropic drugs had superior outcomes. By 12 months, PMA decreased by 66.7%, CPI by 61.6%, and OHI-S by 61.9%. These improvements reflect not only reduced inflammation but also structural periodontal recovery and improved hygiene.

The oral hygiene index also demonstrated a marked improvement. In the main group, the OHI-S decreased by 61.9% (reaching 1.08 ± 0.12 after 12 months), whereas the changes in the comparison group were less pronounced. This finding reflects not only the beneficial impact of the applied therapy but also the increased patient awareness of oral health status, which may be attributed to the use of additional therapeutic interventions.

Correlation analysis revealed a moderate positive association between the dosage of inhaled corticosteroids and the severity of inflammatory changes. After 12 months, the correlation

coefficient between ICS dose and the PMA index was r = 0.61 ($p < 0.05$), for CPI r = 0.55, and for OHI-S r = 0.50. These results confirm the cumulative adverse effect of inhalation therapy on periodontal tissues and underscore the necessity of considering this factor when managing such patients.

The results of the study confirmed the limited effectiveness of standard therapy for chronic generalized catarrhal gingivitis in patients with bronchial asthma. Although there was a reduction in the PMA index from 38.7 ±3.2% to 24.5 ± 2.8%, in CPI from 2.92 ±0.18 to 2.35 ±0.16, and in OHI-S from 2.84 ±0.24 to 2.14 ±0.20, these changes did not reach the threshold of clinically significant improvement ($p > 0.05$). This finding indicates the limitations of conventional approaches in the context of the systemic effects of bronchial asthma and inhalation therapy on periodontal tissues.

The inclusion of mineral therapy and osteotropic agents in the treatment regimen led to substantially better outcomes. By the 12th month, the PMA index had decreased by 66.7% (to 12.9 ± 2.0%, $p < 0.05$), CPI by 61.6% (to 1.12 ± 0.10, $p < 0.05$), and OHI-S by 61.9% (to 1.08 ± 0.12, $p < 0.05$). These results reflect not only a reduction in inflammatory manifestations but also the restoration of periodontal tissue structure and an improvement in oral hygiene status.

Furthermore, correlation analysis revealed an association between the dosage of inhaled corticosteroids and the severity of gingival inflammation, confirming their negative impact. After 12 months, the correlation coefficient between ICS dose and the PMA index was r = 0.61 ($p < 0.05$), underscoring the necessity of individualized treatment planning for this category of patients.

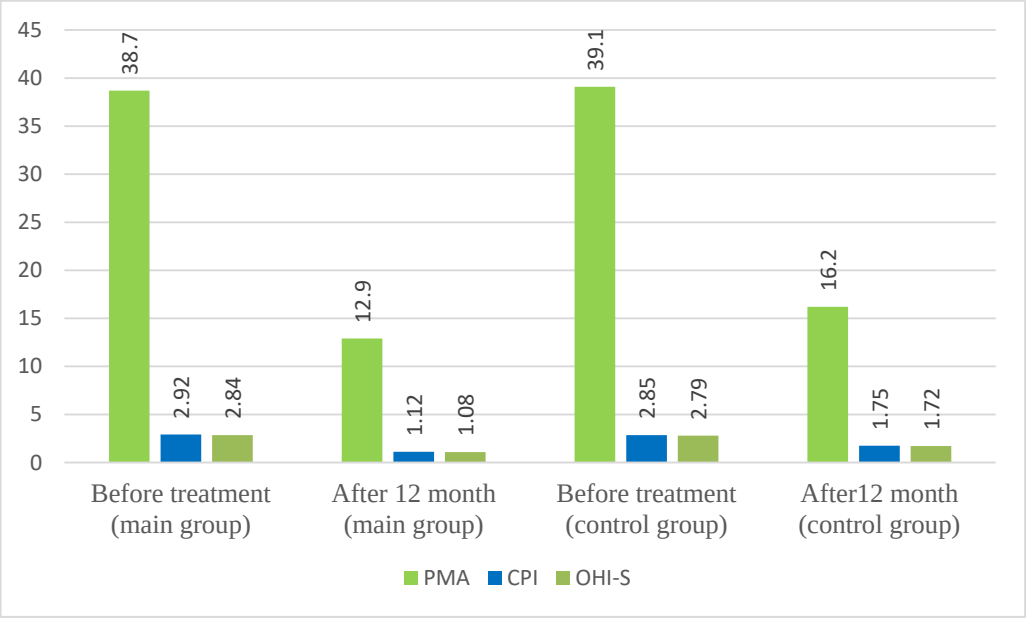
Thus, the study demonstrates the advantages of a comprehensive therapeutic approach that incorporates mineral therapy and osteotropic agents in the management of periodontal inflammatory diseases in patients with bronchial asthma. This strategy not only promotes a more pronounced regression of inflammation but also mitigates the adverse effects of inhalation therapy, thereby enhancing the effectiveness of dental care and improving patients' quality of life.

6. Conclusions

The study revealed a systemic relationship between bronchial asthma and chronic generalized catarrhal gingivitis, demonstrating that long-term inhalation therapy with corticosteroids exerts a pronounced negative effect on periodontal tissues [2]. Patients with bronchial asthma exhibited significantly more severe gingival inflammation, as confirmed by elevated periodontal indices and alterations in the microbiological profile of the oral cavity.

Standard therapy for chronic generalized catarrhal gingivitis proved insufficiently effective in this patient group. Even with conventional treatment, it was not possible to achieve substantial reduction of inflammation or stabilization of periodontal tissue status. Incorporating mineral therapy and osteotropic agents into the therapeutic protocol resulted in a marked improvement in clinical parameters, leading to sustained regression of inflammation, strengthening of connective tissue, and normalization of the mineral balance in oral fluid.

Correlation analysis confirmed a direct association between the dosage of inhaled corticosteroids and the severity of gingival inflammation, indicating the cumulative adverse effect of such therapy on the periodontium. A reduction in ionized calcium levels in oral fluid, observed during the study, further highlighted the importance of maintaining mineral balance in patients with bronchial asthma.



Graph 2. Comparison of treatment effectiveness

The findings suggest that inflammatory diseases of the oral mucosa in patients with bronchial asthma require a revision of standard treatment approaches. Restoring mineral balance and the use of osteotropic agents not only enhance therapeutic efficacy but also provide relapse prevention, making this method a promising direction in dentistry for this patient population.

7. Final Remark

This comprehensive study of chronic generalized catarrhal gingivitis in patients with bronchial asthma identified previously underestimated mechanisms of the adverse impact of long-term inhalation corticosteroid therapy on periodontal tissues. It was established that classical treatment methods in this patient group do not provide sufficient efficacy, which can be explained by their systemic inflammatory response, alterations in the oral microbial composition, and disturbances of mineral metabolism.

The inclusion of mineral therapy and osteotropic agents in the treatment regimen demonstrated a substantial improvement in periodontal tissue condition, as confirmed by dynamic changes in periodontal indices and biochemical analyses. The pronounced reduction in inflammation, normalization of mineral metabolism parameters, and improved oral hygiene status in patients receiving this therapy confirm its necessity in clinical practice.

REFERENCES

[1] Innes DJA, Reid PT. Respiratory diseases. In: Boon NA, Colledge NR, Walker BR, Hunter JAA, editors. Davidson's Principles and Practice of Medicine. 20th ed. Edinburgh: Churchill Livingstone: Elsevier; 2006. p. 670–678.

[2] Johansson I, Ericson T. Saliva composition and caries development during protein deficiency and beta-receptor stimulation or inhibition. J Oral Pathol. 1987; 16: 145–149.

[3] Ryberg M, Möller C, Ericson T. Effect of beta 2-adrenoceptor agonists on saliva proteins and dental caries in asthmatic children. J Dent Res. 1987; 66: 1404–1406.

[4] Ryberg M, Möller C, Ericson T. Saliva composition and caries development in asthmatic patients treated with beta 2-adrenoceptor agonists: a 4-year follow-up study. Scand J Dent Res. 1991; 99: 212 218.

[5] de Almeida Pdel V, Grégio AM, Machado MA, de Lima AA, Azevedo LR. Saliva composition and functions: a comprehensive review. J Contemp Dent Pract. 2008; 9: 72–80.

[6] Steinbacher DM, Glick M. The dental patient with asthma: an update and oral health considerations. J Am Dent Assoc. 2001; 132: 1229–1239.

[7] McDerra EJ, Pollard MA, Curzon ME. The dental status of asthmatic British school children. Pediatr Dent. 1998; 20: 281–287.

[8] Reddy DK, Hegde AM, Munshi AK. Dental caries status of children with bronchial asthma. J Clin Pediatr Dent. 2003; 27: 293–295.

[9] Ersin NK, Gülen F, Eronat N, et al. Oral and dental manifestations of young asthmatics related to medication, severity and duration of condition. Pediatr Int. 2006; 48: 549–554.

[10] Shashikiran ND, Reddy VV, Raju PK. Effect of antiasthmatic medication on dental disease: dental caries and periodontal disease. J Indian Soc Pedod Prev Dent. 2007; 25: 65–68.

[11] Stensson M, Wendt LK, Koch G, Oldaeus G, Birkhed D. Oral health in preschool children with asthma. Int J Paediatr Dent. 2008; 18: 243–250.

[12] Bjerkeborn K, Dahllöf G, Hedlin G, Lindell M, Modéer T. Effect of disease severity and pharmacotherapy of asthma on oral health in asthmatic children. Scand J Dent Res. 1987; 95: 159-164.

[13] Eloot AK, Vanobbergen JN, De Baets F, Martens LC. Oral health and habits in children with asthma related to severity and duration of condition. Eur J Paediatr Dent. 2004; 5: 210–215.

[14] Kargul B, Tanboga I, Ergeneli S, Karakoc F, Dagli E. Inhaler medicament effects on saliva and plaque pH in asthmatic children. J Clin Pediatr Dent. 1998; 22: 137–140.

[15] Kenny DJ, Somaya P. Sugar load of oral liquid medications on chronically ill children. J Can Dent Assoc. 1989; 55: 43–46.

[16] Al-Dlaigan YH, Shaw L, Smith AJ. Is there a relationship between asthma and dental erosion? A case control study. Int J Paediatr Dent. 2002; 12: 189–200.

[17] Sivasithamparam K, Young WG, Jirattanasopa V, et al. Dental erosion in asthma: a case-control study from south-east Queensland. Aust Dent J. 2002; 47: 298–303.

[18] Dugmore CR, Rock WP. Asthma and tooth erosion: is there an association? Int J Paediatr Dent. 2003; 13: 417–424.

[19] O'Sullivan EA, Curzon ME. Drug treatments for asthma may cause erosive tooth damage. BMJ. 1998; 317: 820.

[20] Tootla R, Toumba KJ, Duggal MS. An evaluation of the acidogenic potential of asthma inhalers. Arch Oral Biol. 2004; 49: 275–283.

[21] Harding SM. Gastroesophageal reflux, asthma, and mechanisms of interaction. Am J Med. 2001; 111(Suppl 8A): 8S–12S.

[22] Barron RP, Carmichael RP, Marcon MA, Sandor GK. Dental erosion in gastroesophageal reflux disease. J Can Dent Assoc. 2003; 69: 84–89.

[23] Imfeld T. Prevention of progression of dental erosion by professional and individual prophylactic measures. Eur J Oral Sci. 1996; 104: 215–220.

[24] Hyyppä T, Koivikko A, Paunio KU. Studies on periodontal conditions in asthmatic children. Acta Odontol Scand. 1979; 37: 15–20.

[25] Hyyppä T. Gingival IgE and histamine concentrations in patients with asthma and in patients with periodontitis. J Clin Periodontol. 1984; 11: 132–137.

[26] Irvin RS, Richardson ND. Side effects of inhaled corticosteroids: a physician's perspective. Chest. 2006; 130: 41S–53S.

[27] Hanania NA, Chapman KR, Sturtridge WC, Szalai JP, Kesten S. Dose-related decrease in bone density among asthmatic patients treated with inhaled corticosteroids. J Allergy Clin Immunol. 1995; 96: 571–579.

[28] Mortimer KJ, Harrison TW, Tattersfield AE. Effects of inhaled corticosteroids on bone. Ann Allergy Asthma Immunol. 2005; 94: 15–21.

[29] Wactawski-Wende J. Periodontal diseases and osteoporosis: association and mechanisms. Ann Periodontol. 2001; 6: 197–208.

[30] Han ER, Choi IS, Kim HK, et al. Inhaled corticosteroid-related tooth problems in asthmatics. J Asthma. 2009; 46: 160–164.

[31] Manak TN, Bekzhanova OE. Results of the implementation of expert assessment to improve the quality of diagnosis and treatment of periodontal diseases. Medical News. 2021. Available from: https://cyberleninka.ru/article/n/rezultaty-vnedreniya-ekspertizy-po-uluchsheniyu-kachestvadiagnostiki-i-lecheniya-zabolevaniy-parodonta.

[32] Akhmedov D. Clinical and immunological justification for prosthetics with acrylates in patients with allergic background. Tashkent; https://inlibrary.uz/index.php/autoabstract/article/view/43182 2010.

[33] Namazova-Baranova LS. XXII Congress of Pediatricians of Russia. Current Pediatrics. 2020. Available from: https://vsp.spr-journal.ru/jour/issue/viewFile/87/71#page=62.

[34] Khoryakova OV, Sunyaykin KI. Workbook as a modern method of engaging students in self learning. 2020. Available from: https://elibrary.ru/download/elibrary_42460830_53528878.pdf#page=861.

[35] Abusuev SA, Bakuev MM, Ataev MG, Magomedov MA. Problems of environmental medicine. 2019. Available from: https://elibrary.ru/item.asp?id=35384522.