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Chronic Aphthous Stomatitis in Young People

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Annotation: Chronic aphthous stomatitis (CAS) represents a prevalent oral mucosal disorder in adolescents and young adults, characterized by recurrent, painful ulcerations with significant impact on nutrition, speech, and quality of life. Etiology involves multifactorial interactions including genetic predisposition, immune dysregulation, nutritional deficiencies, microbiota imbalance, and psychological stress. This article examines epidemiology, clinical presentation, immunopathogenesis, diagnostic approaches, and therapeutic strategies, highlighting recent advances in understanding cytokine involvement, T-cell regulation, and topical and systemic interventions. Evidence indicates that early identification and individualized management improve symptom control, reduce recurrence frequency, and enhance functional and psychosocial outcomes in affected populations. Chronic aphthous stomatitis (CAS) represents a recurrent oral mucosal disorder predominantly affecting adolescents and young adults, characterized by painful ulcerations that impair nutrition, speech, and psychosocial wellbeing. Etiology involves complex interactions among genetic predisposition, immune

dysregulation, nutritional deficiencies, microbial factors, and psychological stress. This study examines clinical patterns, immunopathogenesis, biochemical alterations, and therapeutic outcomes in affected populations, highlighting cytokine imbalances, T-cell dysfunction, and epithelial barrier compromise. Evidence demonstrates that integrated management combining topical anti-inflammatory therapy, systemic immunomodulation, microbiota control, and targeted nutritional supplementation significantly reduces ulcer frequency, accelerates mucosal healing, and improves functional and quality-of-life indicators, providing a framework for individualized clinical intervention and long-term disease management.

Keywords: chronic aphthous stomatitis, recurrent oral ulcers, young adults, immune dysregulation, cytokines, topical therapy, systemic management.

Introduction:

Chronic aphthous stomatitis (CAS) is one of the most common oral mucosal conditions observed in individuals aged 10–30 years, with prevalence ranging from 5% to 25% worldwide. Clinically, CAS manifests as recurrent, round or oval ulcers with erythematous margins and yellowish-gray fibrinous bases, predominantly affecting non-keratinized mucosa such as the labial, buccal, and ventral tongue surfaces. Etiopathogenesis is multifactorial, involving complex interactions between genetic susceptibility, dysregulated cellular and humoral immune responses, nutritional deficiencies (iron, folate, vitamin B12), hormonal fluctuations, microbial triggers, and psychosocial stressors. Although self-limiting in many cases, recurrent episodes impair oral functions, diminish quality of life, and may predispose to secondary infections. Understanding immunological mechanisms, particularly T-cell-mediated cytotoxicity, cytokine imbalances, and mucosal barrier integrity, is essential for developing effective diagnostic, preventive, and therapeutic interventions.

Chronic aphthous stomatitis is a multifactorial disorder of oral mucosa manifesting as recurrent painful ulcers with well-defined borders and erythematous halos predominantly located on non-keratinized surfaces such as labial, buccal, and ventral tongue mucosa. Prevalence peaks between 10 and 30 years of age, with higher incidence among females and individuals exhibiting familial predisposition. Pathophysiology encompasses immune-mediated epithelial injury primarily involving Th1-type cytokines including TNF-α, IL-1β, IL-6, and IFN-γ, alongside reduced

regulatory T-cell activity, altered CD4/CD8 ratios, and compromised mucosal barrier integrity. Contributing factors include micronutrient deficiencies (iron, folate, vitamin B12), hormonal fluctuations, microbial colonization, mechanical trauma, and psychological stressors, creating an environment conducive to recurrent ulcer formation. Clinical manifestations often lead to functional impairment, social discomfort, and nutritional challenges, emphasizing the necessity for comprehensive evaluation integrating clinical, biochemical, immunological, and microbiological parameters to guide effective therapeutic strategies.

Research Methods and Approaches:

This study utilized a cross-sectional observational design involving 120 young patients aged 14–28 years diagnosed with CAS at the Department of Therapeutic Stomatology, Samarkand State Medical University. Clinical evaluation included lesion number, size, location, pain intensity, and recurrence frequency. Laboratory investigations assessed complete blood count, serum iron, ferritin, vitamin B12, folate levels, and immunological markers including CD4/CD8 ratios, TNF-α, IL-1β, IL-6, and IFN-γ. Oral swabs were collected for microbiological analysis to identify potential bacterial and fungal contributions. Patients were stratified according to ulcer severity using the validated Ulcer Severity Score. Therapeutic interventions included topical corticosteroids, antiseptic rinses, systemic immunomodulators in severe cases, and nutritional supplementation where deficiencies were identified. Data analysis involved descriptive statistics, correlation analysis between immunological and clinical parameters, and assessment of therapeutic efficacy based on symptom reduction and recurrence frequency over a six-month follow-up period.

Results:

Among the 120 patients, 68% were female and 32% male, with a mean age of 21.4 ± 3.1 years. Minor aphthae (<1 cm) accounted for 72% of lesions, major aphthae (>1 cm) for 20%, and herpetiform ulcers for 8%. Mean recurrence frequency was 4.3 episodes per year. Laboratory findings revealed deficiencies in iron (31%), folate (18%), and vitamin B12 (24%). Immunological evaluation showed elevated pro-inflammatory cytokines TNF-α and IL-6 in 56% of patients, with decreased CD4/CD8 ratios indicating T-cell dysregulation. Microbiological analysis detected increased colonization with Streptococcus sanguinis and Candida species in 42% of cases. Therapeutic outcomes demonstrated significant reduction in pain and lesion duration with topical corticosteroids (mean healing time 6.2 ± 1.1 days), while systemic immunomodulators and nutritional supplementation decreased recurrence frequency by 40% over six months. Patients receiving combined therapy exhibited improved mucosal integrity and reduced ulcer severity scores, correlating with normalized cytokine profiles and partial restoration of immune balance. Analysis of patient data demonstrated that minor aphthae (<1 cm) comprised the majority of lesions, while major ulcers (>1 cm) and herpetiform variants represented smaller proportions. Recurrence frequency averaged four to five episodes per year, with pain intensity ranging from mild discomfort to severe impairment affecting mastication and verbal communication. Laboratory evaluation revealed deficiencies in iron, folate, and vitamin B12 in a significant subset of patients, correlating with prolonged healing times and increased recurrence rates. Immunological assessment identified elevated pro-inflammatory cytokines TNF-α and IL-6, decreased CD4/CD8 ratios, and reduced regulatory T-cell populations, indicating dysregulated cellular immunity. Microbial analysis detected overrepresentation of Streptococcus and Candida species within ulcer sites, suggesting a contributory role in persistent inflammation and delayed epithelial repair. Therapeutic interventions employing topical corticosteroids produced rapid symptomatic relief and lesion resolution within approximately six days, whereas systemic immunomodulatory therapy in combination with micronutrient supplementation significantly decreased recurrence frequency over six months, improved mucosal integrity, normalized cytokine levels, and restored partial immune homeostasis. Patients receiving integrated treatment exhibited enhanced oral function, reduced pain severity, and improved psychosocial wellbeing, confirming the efficacy of multifactorial management.

Discussion:

Findings highlight the multifactorial nature of CAS in young adults, with immune dysregulation, micronutrient deficiencies, and microbial imbalances playing key roles. Elevated TNF-α and IL-6 levels suggest a predominant Th1-mediated inflammatory response contributing to epithelial damage and delayed healing. T-cell subset alterations indicate impaired immunoregulation, facilitating recurrent ulceration. Nutritional deficiencies exacerbate mucosal vulnerability, while microbial colonization may trigger local immune activation. Therapeutic interventions targeting inflammation, restoring nutritional status, and controlling microbial burden proved effective in reducing ulcer severity and recurrence. Topical corticosteroids remain the first-line option for rapid symptom relief, whereas systemic agents are indicated for refractory cases. Integrating immunological assessment and nutritional correction into routine management enhances long-term outcomes, while patient education on stress reduction, oral hygiene, and trigger avoidance supports sustained remission. The observed findings emphasize that CAS arises from a complex interplay between immune dysregulation, nutritional insufficiency, microbial factors, and environmental or psychological triggers. Elevated Th1 cytokine activity contributes to epithelial cytotoxicity and prolongs healing, while reduced regulatory T-cell activity permits recurrent lesion formation. Nutritional deficiencies exacerbate mucosal vulnerability by impairing tissue repair and modulating immune responsiveness, whereas microbial colonization may trigger local inflammatory cascades. Topical corticosteroids effectively suppress local inflammation and expedite ulcer resolution, whereas systemic immunomodulators are essential for patients with severe or refractory disease. Nutritional supplementation restores deficient cofactors, enhancing epithelial repair and immune resilience, while microbiota management reduces secondary inflammation and prevents reinfection. Comprehensive treatment protocols integrating these approaches improve both short-term healing and long-term recurrence reduction, highlighting the importance of individualized therapy guided by immunological, nutritional, and microbiological assessment. Patient education, stress management, and behavioral modifications further support sustained remission and quality-of-life enhancement.

Conclusion:

Chronic aphthous stomatitis in young populations represents a complex interplay of immune dysregulation, nutritional inadequacies, microbial influences, and psychosocial factors. Early recognition, comprehensive evaluation, and individualized therapeutic strategies incorporating topical anti-inflammatory agents, systemic immunomodulators, and nutritional supplementation significantly improve symptom control, reduce recurrence, and promote mucosal healing. Multidisciplinary management, including patient education and lifestyle modification, is essential for long-term prevention and quality-of-life improvement in affected individuals. Future research should explore targeted immunotherapies and microbiome-modulating approaches to further optimize outcomes. Chronic aphthous stomatitis in young populations reflects a multifactorial condition involving immune imbalance, micronutrient deficiency, microbial influences, and psychosocial stress, resulting in recurrent, painful ulceration that impairs oral function and quality of life. Effective management requires a comprehensive strategy encompassing topical anti-inflammatory therapy, systemic immunomodulation, nutritional correction, microbiota control, and patient-centered lifestyle interventions. Integrated therapeutic approaches significantly reduce lesion frequency, accelerate healing, restore immune balance, and enhance functional outcomes. Early diagnosis, targeted intervention, and continuous monitoring are critical for preventing complications, improving long-term prognosis, and supporting overall oral health in affected individuals.

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