



Anxiety and Sun Exposure as Triggers for Herpes Labialis: A Case Report and Review of Literature

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Introduction: Herpes labialis (HL) is a prevalent viral infection caused by herpes simplex virus type 1 (HSV-1), affecting a significant portion of the global population. The reactivation of HSV-1 leading to HL can be triggered by various factors, including psychosocial factors (depression, stress, and anxiety), exposure to ultraviolet light, a febrile environment, and specific dietary inadequacy.

Purpose: This case report explores the association between HL, psychological conditions, and sun exposure.

Case Report: A 20-year-old male patient came with a chief complaint of swollen lips with tiny pimples for two days, accompanied by malaise. The patient was working as a florist in a sun-exposed area and experiencing stress due to financial difficulties. Extraorally, multiple vesicles were found on the left side of the upper lip, surrounded by erythema, and painless. Laboratory examinations showed a reactive HSV-1 IgG. The depression, anxiety, and stress scale-21 (DASS-21) questionnaire showed an extremely severe level of anxiety.

Case Management: The patient was given systemic and topical acyclovir, multivitamins, hyaluronic acid mouthwash, and petroleum jelly. In addition, the patient was advised to reduce the frequency of sun exposure, apply sunscreen, and seek professional help to manage the anxiety. A review of eight case reports related to HL from 1994–2024 has been reported in this literature and emphasizes the connection of HL with psychological factors and sun exposure.

Conclusion: This case underscores the potential link between anxiety, sun exposure, and the onset of HL. Understanding these associations is crucial for effective management and prevention strategies.

Keywords: anxiety, DASS-21, herpes labialis, HSV-1, oral diseases, sun exposure

Introduction

Herpes labialis (HL), also known as fever blisters or cold sores, is a viral infectious condition caused by the herpes simplex virus (HSV).^{1–3} HL presents two subtypes, HSV-1 and HSV-2, that affect skin and mucous membranes.^{4,5} HSV-1, on the other hand, mainly impacts the orofacial region.^{1,4,6} The prevalence of HSV-1 infection and seropositivity increased gradually with age and was associated with socioeconomic status. According to the World Health Organization (WHO), about 3.7 billion individuals, or 67% of the population under the age of 50, are infected with HSV-1 globally.⁷ Various studies have reported the seroprevalence of HSV-1 at 60–90% worldwide, with the incidence of HL is approximately 1.6 per 1000 patients each year.^{5,7,8}

HSV-1 is a double-helix deoxyribonucleic acid (DNA) virus transmitted via direct contact, including skin-to-skin contact, exposure to mucosal surfaces, saliva dissemination, contact with active lesions, oral-to-oral transmission, and respiratory infections.^{2,9,10} HSV-1 pathogenesis occurs in the lytic phase (primary or productive) and the dormant phase (latent).^{9,11} HSV infection can be latent or reactivated.¹⁰ Viral reactivation, spontaneous or caused by diverse local or systemic factors, is responsible for recurrent herpetic infections.¹ The factors that trigger HL outbreaks are not fully understood but are often associated with psychological and physiological conditions and exposure to sunlight.^{9,12,13}

Prodromal signs and symptoms of HL include discomfort, burning, itching, tingling, localized warmth, and erythema of the affected epithelial tissue, occurring 6 to 24 hours before lesion development.^{3,14,15} Multiple small, erythematous papules develop and form clusters of fluid-filled vesicles.¹⁵ These become unroofed and coalesce to form map-like superficial ulcers.³ The diagnosis is typically based on clinical history and examination; however, specific laboratory tests may be required in some cases.^{16,17} Although recurrent HL is a self-limiting disease, it usually causes painful lesions and discomfort in patients.¹ Therefore, it is crucial to understand the risk factors that may trigger HL to manage the underlying illnesses, mitigate symptoms, and prevent deterioration that might decrease the quality of life.¹²

This study demonstrates the improvement of oral lesions and decreased anxiety score in a patient with HL triggered by psychological conditions and sun exposure. This case report explores the association between HL, psychological conditions, and sun exposure. This paper is interesting because of the history of sun exposure, the psychological state that triggered HL, and the presence of geographic tongue conditions that co-existed with HL. In addition, this paper includes a review of some different cases of HL with related risk factors, such as psychological conditions and sun exposure, as well as their options for therapy.

Case Presentation

A twenty-year-old male patient came to the Oral Medicine Department at Padjadjaran University Dental Hospital complaining of swollen lips with tiny pimples that were painful and itchy for two days, accompanied by malaise. The patient went to the general practitioner the previous day and was given a topical medication of glycerin borax applied to the lips three times a day. He denied any history of systemic disease and no drug and food allergies. Smoking and alcohol consumption were refuted by the patient, who last consumed alcohol four years ago. The patient brushed his teeth twice daily, once in the morning and once before bedtime.

Since two years ago, the patient has worked as a florist in a sunny area from morning to evening. The patient feels anxious and stressed due to financial difficulties for the last two years, making sleeping difficult. He had a poor diet (he rarely consumed vegetables and fruits), inadequate water intake, a lack of sleep, and rarely exercised. The patient felt an inability to self-regulate his psychological condition but had never consulted a psychologist or psychiatrist.

The extraoral examination showed multiple vesicles on the sinister upper lip, surrounded by erythema, with a diameter of 1mm and painless (Figure 1A). Furthermore, there are dry lips that are also exfoliative. The intraoral examination indicated

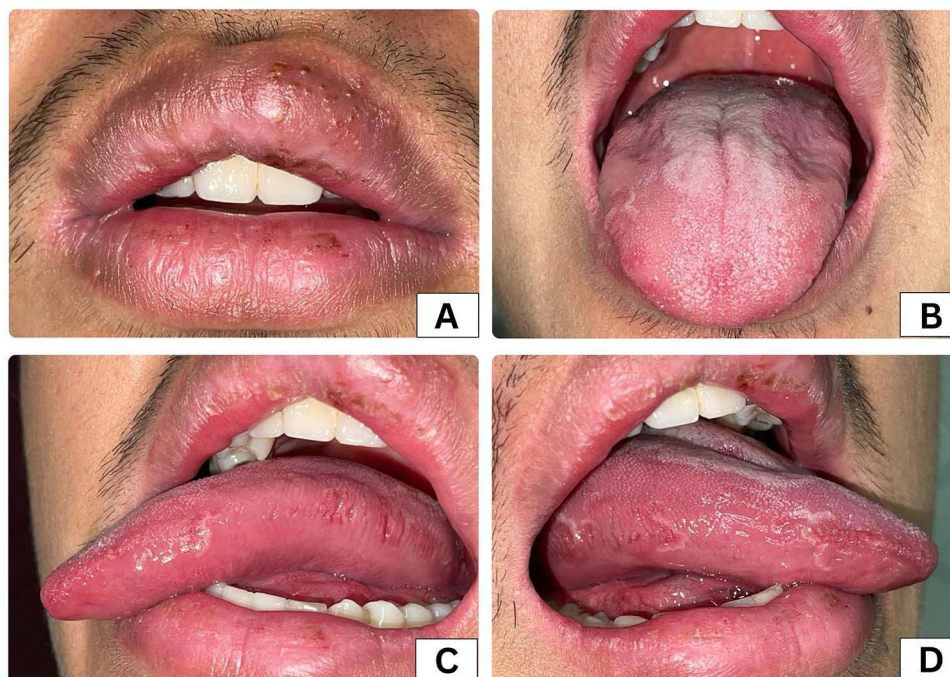


Figure 1 Clinical findings during the initial visit: (A) Vesicles on the sinister upper lip, dry and exfoliative lips; (B) Depapillation on the dorsum of the tongue; (C and D) Depapillation on the left and right lateral of the tongue.

depapilation and a white plaque on the dorsum of the tongue (Figure 1B–D). No vesicles or ulcers were found in the other oral mucosa. The oral hygiene index simplified (OHI-S) was utilized to evaluate oral hygiene status.¹⁸ Plaque and stains were observed in all regions of his teeth, with calculus present in some regions, yielding a score of 2.5, indicating moderate oral hygiene. The pain intensity of the tongue condition was measured using a numerical rating scale (NRS), and the result was a score of five, which is moderate pain.¹⁹

The patient was assessed using the depression, anxiety, and stress scale-21 (DASS-21) questionnaire to evaluate his psychological conditions and screen for common mental disorders.²⁰ The results showed a general score of 34 and a specific anxiety score of 20, indicating an extremely severe level of anxiety. However, the depression score was six, and the stress score was eight, both falling within the normal range.

The clinical symptoms and clinical features on the lips lead to the diagnosis of herpes labialis (HL). Routine hematology, anti-HSV-1 IgM, and IgG tests were conducted to confirm the patient's diagnosis. The serological examination of the patient resulted in a positive value for anti-HSV-1 IgG titer. The results established the diagnosis of HL of the lips. In addition, the patient was also diagnosed with exfoliative cheilitis, coated tongue on Miyazaki scale 2, and geographic tongue (GT).

Case Management

Patient management was carried out using pharmacologic and non-pharmacologic therapies. Pharmacological treatments such as systemic acyclovir 400mg (three times a day for a week), 5% acyclovir cream (applied on the lips five times a day for a week), and multivitamins (one tablet daily) were given for herpes labialis therapy, 0.025% hyaluronic acid mouthwash (rinse 10mL three times a day) was given for GT therapy, 100% petroleum jelly (apply on the lips three times a day) was given for exfoliative cheilitis therapy.

Non-pharmacological approaches are given to address the triggers and contributing factors of HL, especially anxiety and sun exposure, as well as the presence of geographic tongue, which may also be related to psychological conditions. These aim to support immune function, reduce the reactivation of viruses, and alleviate symptoms. Oral hygiene (OHI) instructions including brushing teeth and scrubbing the tongue twice a day (in the morning after breakfast and at night before bed) can be beneficial to help maintain oral health, minimize secondary infections, and reduce irritation on the tongue surface.

Lifestyle modifications such as reducing the frequency of outdoor activities, applying sunscreen, exercising regularly or doing hobbies, and eating a balanced diet with adequate hydration (two liters of water daily) are recommended to improve overall health and immunity. In addition, the patient is encouraged to reduce anxiety through motivation from inside or support from others and is also referred to mental health experts (psychiatrists or psychologists), as psychological conditions are known to aggravate herpes labialis and geographic tongue.

The patient had control visits periodically and reported positive results from therapy at every visit. The patient felt his lips and oral cavity had improved at the first follow-up visit (the seventh day following the initial visit). The patient had made lifestyle modifications as recommended, including minimizing the frequency of sun exposure, applying sunscreen, eating a balanced diet, exercising, and self-motivation. However, the patient had not visited mental health experts due to financial reasons. He used the medication as instructed. Oral hygiene has improved and decreased OHI-S scores. The patient brushes his teeth regularly, as recommended, but often misses scraping the tongue.

The evaluation results of the clinical examination at the first follow-up visit showed that HL had an improved clinical condition and reduced pain and itching. Exfoliative cheilitis also improved, and GT became asymptomatic, but the coated tongue on Miyazaki scale two still existed. Pharmacological therapy of systemic acyclovir 400mg (three times a day for a week), 5% acyclovir cream (applied on the lips five times a day for a week), 100% petroleum jelly (applied on the lips three times a day) and multivitamins (one tablet daily) was still given, whereas 0.025% hyaluronic acid mouthwash was discontinued. The patient was educated to continue a healthy lifestyle and maintain oral hygiene regularly. The patient was also reassured of the importance of comprehensive care from a mental health professional to improve his psychological and oral health.

After one month, the patient attended a second follow-up appointment and no longer complained of his lips and oral cavity condition. The patient maintained the lifestyle modifications as suggested, such as minimizing the frequency of sun exposure, applying sunscreen, consuming a balanced diet, and exercising. The patient has also improved her self-

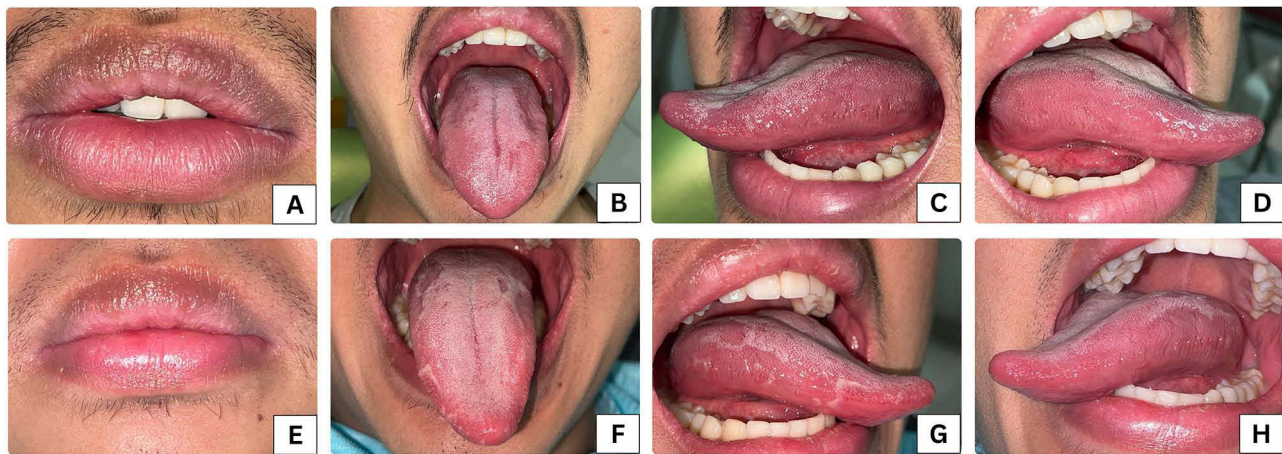


Figure 2 (A–D) Clinical presentation on the seventh day. The lesions on the lips have been improved; **(E–H)** Clinical presentation during one-month control. Herpes labialis lesions disappeared.

motivation and has family support for his condition but has not yet visited a mental health professional due to financial reasons. He took his medication as instructed. The patient brushes her teeth regularly as recommended but sometimes forgets to scrap his tongue. The NRS score on the tongue is 0, which is no pain. The DASS-21 questionnaire showed a reduction in the total score to 27 and the anxiety score to 13, which describes severe anxiety.

Clinical examination evaluation results at the second follow-up visit (one month) showed that HL and exfoliative cheilitis had resolved entirely, GT became asymptomatic, and the coated tongue had improved and decreased in score to coated tongue Miyazaki scale 1. **Figure 2** shows the clinical presentation on day seven (A–D) and after one month (E–H). All medications were discontinued. To reduce the frequency and prevent the severity of HL recurrence in the patient, sun protection by minimizing the frequency of sun exposure, applying sunscreen daily, especially for the face and lip area, and using physical protection such as a wide-brimmed hat when working in the sun should be performed. In addition, the patient was also encouraged to reduce anxiety by continuing to do relaxation activities such as exercise, sleeping adequately, motivating himself, and asking for family support. He was also reassured of the importance of managing his psychological condition and anxiety with a mental health professional.

The patient was also educated on early signs of HL recurrence, such as tingling or itching of the lips. In addition, patients were given information regarding other possible triggers for recurrence, such as local trauma to the lips, fatigue, and hormonal changes. The patient is scheduled for periodical follow-up visits every six months or, if there are symptoms of recurrence, to monitor HL recurrence and evaluate clinical status, oral hygiene, and psychological condition.

Discussion

Herpes labialis (HL) is a highly prevalent worldwide viral infection affecting oral and perioral regions.^{1,8,21,22} In this case report, the patient with HL was a young adult male of 20 years old. In young adult patients, the risk of recrudescence herpes simplex virus (HSV) on the lips occurs at around 20–40%.^{12,14} The sex ratio between males and females varies, with an estimated higher frequency occurring in females.^{7,14,23} One-third of all females are estimated to experience at least one relapse per year.⁷ This number differs significantly across studies from different countries and communities.^{14,23}

This study highlights the potential factors that may trigger the reactivation of HL in the patient. This case report also reviews other case reports related to HL published between 1994 and 2024 to better understand HL's trigger factors. The inclusion of the case report includes a mention of the risk factors that may have triggered HL in the patient. This review may enhance our knowledge of possible risk factors associated with HL.^{24–31} Eight HL case reports were found and summarized in **Table 1**. The literature search yielded three articles from Indonesia,^{24–26} one from Brazil,³¹ one from Nigeria,²⁷ one from Turkey,²⁸ one from Germany,²⁹ and one from Japan.³⁰ In these eight case reports, there were fourteen patients with HL. The age range of the reported HL patients was the youngest at 21 years and the oldest at 63 years. The most reported patients in the literature review were female, eleven females, and three males.

Table I Review of the Literature of Herpes Labialis Case Reports

No	Author, Years	Country	Age	Sex	Risk Factors	Treatment
1	Setyowati et al, 2023 ²⁴	Indonesia	44	F	Physical and mental stress	Topical 5% acyclovir cream, multivitamin tablets
2	Lago et al, 2020 ³¹	Brazil	22	F	Exposed to the sun.	Antimicrobial photodynamic and photobiomodulation therapy
			28	F		
			25	F		
3	Mandasari et al, 2018 ²⁵	Indonesia	21	M	Psychological and physical stress	Topical 5% acyclovir cream, chlorhexidine solution.
4	Azodo et al, 2013 ²⁷	Nigeria	63	F	Stress and exhaustion, immunosuppression (diabetes mellitus), and heat produced from ultrasonic scaling.	The patient refused to be treated
			40	M	Stress and exhaustion, immunosuppression (malaria), and heat produced from ultrasonic scaling.	
5	Prehananto et al, 2012 ²⁶	Indonesia	58	F	Psychologically distressed conditions (emotional stress)	Systemic and topical acyclovir
6	Yazici et al, 2004 ²⁸	Turkey	33	F	Photosensitivity	Lip balms with sunscreens properties
7	Bschor et al, 1999 ²⁹	Germany	44	F	Psychological factors	Antiviral potential of lithium
8	Hijikata et al, 1998 ³⁰	Japan	60	M	Physical and psychological exhaustion	Herbal extracts WTTC, <i>Ganoderma lucidum</i> , and <i>Elfuinga applanata</i>
			47	F	Psychologically very busy and sleep deprived.	
			42	F	Stress overworked and developed a common cold	
			55	F	Very tired, increased mental and physical stress	

Abbreviations: F, Female; M, Male; WTTC, *Wisteria floribunda-Terminalia chebulae-Trapanatans-Coicisemen*.

Based on the review of the literature results, factors that may contribute to HL recurrence include psychological factors, physical exhaustion, sun exposure, immunosuppression due to diabetes and malaria, dental treatment (heat generated during ultrasonic scaling), and illness (common cold). The most frequent risk factors in this review were psychological factors. All fourteen patients in the case report also showed different clinical variability of HL, with the final diagnosis confirmed by various examinations. The treatments included antiviral acyclovir (systemic and topical), lip balms with sunscreen properties, multivitamins, herbal mixtures, lithium (antiviral potential), photodynamic and photobiomodulation therapy, and only OHI.^{24–31}

The virus should be connected to mucosal surface areas or abraded and wounded skin to initiate a primary infection. The virus began to replicate, and the capsid was transported from neurons to the dorsal root ganglia, where latency was established.¹¹ Following initial infection, the virus travels down peripheral sensory neurons to the ganglia and stays non-replicating, resulting in a latent infection.⁴ The infectious virus and viral antigens are undetectable during latency due to the replicative activity's downregulation. This strategy allows the virus to remain undetected by immune surveillance.¹³ Extranuclear latency (ie, HSV remaining latent in cells other than neurons such as the epithelium) may play a role in recurrent lesions of the lips.¹⁴

HSV can spontaneously reactivate from its non-infectious latent condition, leading to a recurring infection.³² Internal or external stimuli such as psychosocial factors (depression, stress, and anxiety), exposure to ultraviolet light, a febrile environment, fatigue, immunosuppression, and specific dietary inadequacy are known to contribute to reactivation and migration of the virus to the skin and mucosa sites, resulting in a clinical episode of secondary or recurrent herpes

infection, mainly in the perioral areas.^{5,13} All of these factors cause viral reactivation and replication within the ganglia. The reactivated virus propagates centrifugally along the axon until it arrives at the cutaneous or mucosal site.¹³

The patient admitted that he had been feeling anxious and stressed due to financial difficulties for the past two years, and it had gotten worse in the past few weeks, which caused him difficulties sleeping. The term anxiety comes from the Ancient Greek word *anxietas*, which means worry, fear, and curiosity. Anxiety is an unconscious and unknown reaction that a person has to internal dangers. In other words, anxiety is a mood experienced in the face of danger resulting externally.³³ Anxiety disorders are one of the most frequent types of mental diseases globally.³⁴

The problem of the patient's psychological condition in the oral medicine field is crucial to recognize before diagnosis and after treatment, and therefore, identification using psychological questionnaires such as the DASS-21 was conducted.³⁵ The results of the DASS-21 questionnaire showed that the patient had an anxiety score of 20, which was determined as extremely severe and then decreased to severe anxiety (score 13) at the second follow-up. The DASS-21 is a psychological measurement scale that can assess three different major psychological disorders simultaneously, such as stress, anxiety, and depression. The instrument is reliable, brief, and comprehensive.^{36,37}

Since the oral mucosa is highly reactive to emotional influences such as anxiety, oral diseases may appear as a direct expression of emotions or an indirect result of psychological alterations.³⁸ Psychological factors lead to alterations in the immune system (T cells, B cells, natural killer cells, and immunoglobulin); endocrine system markers (cortical and aldosterone); nervous system markers (catecholamines, adrenaline, noradrenaline, and dopamine); vascular and muscular function.^{37,39}

Psychological distress, such as anxiety, showed a significant association with symptomatic HSV recurrence.⁴⁰ A previous study demonstrated that psychological factors are recognized to increase HSV-titers.^{9,41,42} Although psychological conditions are also often mentioned as triggers for HL recurrence, the specific nature of psychological disorders and their possible mechanisms remain poorly identified.^{32,40}

Epinephrine may play a role in affecting the balance that promotes HSV recurrence.^{32,41} Macrophages may serve as the primary cells affected by the immune defense against HSV infection. Epinephrine markedly suppresses the capacity of macrophages to be activated by interferon-gamma (IFN- γ) to a cytolytic state capable of destroying HSV-infected cells.³² Consequently, elevated epinephrine the week before an outbreak could provide the right environment for an impaired ability to destroy HSV-infected cells.^{32,41}

The adrenal cortex releases the glucocorticoid cortisol, which causes long-term stress responses. The hypothalamic-pituitary-adrenal (HPA) axis can be activated by stress, which raises corticosteroid levels.^{9,10} Corticosteroids induce cellular immunomodulation by indirectly suppressing the production of essential proinflammatory cytokines, chemokines, and adhesion molecules. Modulation of the cellular immune system can potentially affect viral replication.^{9,41} Stress-assisted immunomodulation (SAI) is an immunological response to HSV reactivation triggered by stress. In contrast, during acute and chronic stress, the body releases epinephrine, interleukins (IL-1, IL-6), Cyclic Adenosine Monophosphate (cAMP), glucocorticoids, and prostaglandins.¹⁰ Psychological stress inhibits natural killers, vital defense mechanisms against viral infections.⁹

The patient reported experiencing reactivation of the HSV-1 virus, possibly due to high sun exposure while working as a florist from morning to evening. Although its components play a role in endogenous photoprotection against ultraviolet (UV) radiation, lips are vulnerable to the negative effects of sunlight and UV damage.⁴³ High sun exposure increases the risk of exposure to UV light, such as ultraviolet-B (UV-B), which is known to be a common triggering factor for HL recurrence.^{7,43,44} Previous studies have demonstrated that prone individuals, such as swimmers, fishermen, farmers, and skiers, have prolonged sun exposure and typically present with lesions and vesicles on the vermilion border after 3 to 5 days. Furthermore, intentional exposure to regulated amounts of UV radiation led to the development of lower lip lesions in individuals with 60% seropositivity for HSV-1.⁷

There are many possible mechanisms by which the thought of UV exposure may impact HSV recurrence. The first pathway is the possible effect of UV radiation depressing immunological responses.⁴⁴⁻⁴⁶ UV radiation has been demonstrated to suppress the presentation of HSV antigens to epidermal cells and reduce the secretion of type I cytokines, which play a crucial role in the immune response to viruses like HSV.⁴⁶ UV exposure induces inflammation, leading to the release of proinflammatory mediators, including tumor necrosis factor- α (TNF- α), interleukins (IL), and

prostaglandin E2 (PGE2). PGE2, in particular, is involved in various immune responses associated with developing HL.⁴³ Localized immunosuppression can result in the proliferation of viruses and perhaps trigger a relapse.^{44–46}

The second possible pathway is that UV radiation directly affects recurrence through reactivation of latent HSV.^{44–46} Previous studies have also shown an association between increased time outdoors when the UV index is relatively high and the risk of HSV recurrence.⁴⁴ Cell repair activates the HSV transcription promoter (infected cell polypeptide 0) via the transcription factors c-Jun and c-Fos, leading to HSV transcription and reactivation. In addition, this repair pathway avoids HSV latency-associated transcript activity and prevents infected neurons from undergoing apoptosis, which would reactivate HSV.^{44–46}

Based on the history, the patient felt swollen lips with small pimples that were painful and itchy for two days, accompanied by malaise. The history of fever before the onset of the ulcers leads to the suspicion of the involvement of a viral infection, especially the HSV-1 virus. Therefore, at the initial visit, the patient was referred for routine hematology, anti-HSV-1 IgM, and anti-HSV-1 IgG tests. The enzyme-linked immunosorbent assay (ELISA) examination showed reactive anti-HSV-1 IgG with a value > 200 U/mL. Therefore, the diagnosis was established as HL.

Specific HSV-1 IgM and IgG antibodies were tested serologically to confirm suspected HSV infection.¹⁰ ELISA technique is widely used to detect antibodies from patients blood utilizing entire antigens. ELISA is easy to perform and yields quickly, with a sensitivity range of 92–100% and a specificity range of 61–85% for differentiating between two types of HSV.⁴⁷ Based on its life cycle, HSV reactivation will release viral progeny in the oral cavity, detected in HSV seropositive individuals.¹⁰ The four-fold value compared to the normal value indicates ongoing or current infection.⁹ Antibodies manifest about 4–7 days post-infection and peak during 2–4 weeks. Anti-HSV IgG antibody titers typically increase 1–2 weeks post-primary infection, reaching their peak level 6–8 weeks after that.^{9,48}

In this case, the patient's HL was evaluated five weeks after infection; thus, the absence of clinical symptoms and complete re-epithelialization of the lesions were sufficient indicators that the infection was entirely resolved. In the healing phase, the number of virus particles in the lesion decreases significantly, making microbiology tests less sensitive. In addition, in a typical case such as HL, laboratory or microbiology testing to evaluate HL resolution requires greater cost and longer time. These tests might be considered in immunocompromised patients with infectious complications or infections that do not resolve. However, in immunocompetent patients with HL who are already in the healing phase, evaluation of clinical symptoms is sufficient.^{49–51}

In this case report, the patient also complained of a sore tongue and guessed it was oral cancer and possibly dangerous. The oral medicine specialist diagnosed the condition as geographic tongue (GT). GT is a noninfectious tongue disease characterized by the appearance of one or more atrophic areas on the dorsum and lateral edges of the tongue due to the absence of filiform papillae, which appear similar to a map.^{37,52,53} The condition is called migratory glossitis because of its potential for changes in boundaries, size, and location at any time.⁵² These lesions are characterized by periods of exacerbation and remission without scarring.⁵⁴

The etiology of GT remains largely unknown.⁵⁴ Genetics, psychological problems (inside the presence of anxiety and stress), allergies, acquired immunodeficiency, and drug use are among the effective factors in the occurrence of these lesions.^{37,55} Previous studies support that psychological problems are a contributing factor to the development and aggravation of GT.⁵⁶ Redman et al have reported a higher incidence of GT in patients with mental illness.⁵⁷ Alikhani et al revealed that feeling anxious and cortisol levels were markedly elevated in individuals with GT.^{37,56} Ebrahimi et al also showed an association between psychological conditions and GT.⁵⁷ In this case, GT was identified as a normal variation of the oral mucosa, with the etiology unknown, albeit it may be precipitated by emotional factors such as anxiety.^{56,58,59}

Since it is benign nature and its course is mostly asymptomatic, patients with GT usually do not receive treatment.⁵⁴ In symptomatic cases, pharmacotherapy is recommended to enhance the quality of life and decrease the chance of recurrence.⁶⁰ Many cases of GT are neglected, and some patients show symptoms of cancerophobia and do not receive appropriate education and treatment.⁶¹ To reduce pain and/or burning sensation and discomfort, anti-inflammatories, oral analgesics, antihistamines, mouthwashes and gels anesthetic, vitamins, and zinc can be considered.^{54,60} The discomfort from GT can be reduced or prevented by avoiding irritating substances that aggravate the injury, such as alcohol, chewing tobacco products, and eating hot, spicy, and acidic foods. Patients are also encouraged to maintain good oral hygiene, with toothpaste free of colorants and preservatives.^{37,54}

Therapy for oral lesions from the Oral Medicine Department was systemic and topical acyclovir, multivitamins, 0.025% hyaluronic acid mouthwash, and 100% petroleum jelly. Despite being a self-limiting disease, HL often induces painful lesions and discomfort in patients.¹ The standard therapeutic option for the treatment of HL is the antiviral acyclovir. Acyclovir is administered topically, intraorally, and intravenously.⁶² Thymidine kinase in HSV converts acyclovir to acyclovir monophosphate, which then converts to acyclovir diphosphate and acyclovir triphosphate. Acyclovir triphosphate competitively inhibits viral DNA polymerase and viral DNA replication and inhibits DNA synthesis by acting as a chain terminator. Acyclovir is selective and low in cytotoxicity to normal cellular thymidine kinase; uninfected cells do not use acyclovir effectively as a substrate.^{24,63} This drug relieves unpleasant symptoms, reduces the duration of the sickness, inhibits the advancement of the condition, and lowers transmission.^{1,21,50}

In this case, the patient presented with prodromal symptoms two days after the lesions appeared. Systemic administration of acyclovir can prevent further progression of the infection, while topical acyclovir can reduce local symptoms such as pain and itching.^{51,64} Systemic acyclovir is effective in inhibiting the replication of HSV throughout the body and reducing the severity and duration of HL symptoms. Systemic acyclovir also works as prophylaxis to prevent recurrence in individuals with high-risk factors, such as sun exposure and psychological disorders.^{49,51} At the same time, topical acyclovir allows the drug to act at the site of infection directly on the skin lesion, reducing the amount of virus on the surface of the lesion, shortening the duration of symptoms such as pain or burning, accelerating local healing and re-epithelialization.^{49,51,65} Combining systemic and topical acyclovir may provide a synergistic and comprehensive effect to treat active infection and prevent recurrence in patients with specific triggering factors such as sun exposure and psychological disorders.

Patients are also given supplementation therapy, specifically multivitamins containing vitamins A, B1, B2, B3, B5, B6, B12, C, D, and E, and minerals (iodine, ferrous, copper, manganese, magnesium, and zinc). Multivitamins are needed to enhance the immune system's response to pathogens, aiding physical and biochemical defenses, innate immunity, adaptive immunity, cell-mediated immunity, and antigen recognition.⁶⁶

In this case, the complaint of GT pain was given hyaluronic acid mouthwash, a topical non-steroidal anti-inflammatory therapy to help heal.⁶⁷ The treatment of GT was evaluated by measuring pain intensity using the NRS. NRS scores range between 0 to 10, where 0 indicates no pain, 1–3 denotes mild pain, 4–6 signifies moderate pain, and 7–10 represents severe pain. In this case, the NRS in GT decreased from 5 (moderate pain) to 0 (no pain).¹⁹ The inflammation and epithelial regeneration of GT fluctuate and require more time for spontaneous resolution. GT resolution can be supported and accelerated by eliminating triggering factors and using pharmacotherapy such as hyaluronic acid anti-inflammatory agents. GT may experience regression. However, it is hard to predict precisely when and how this occurs.^{14,37}

The patient was given 100% petroleum jelly, which was applied thinly on the lips to treat the condition of exfoliative cheilitis. Petroleum jelly, or petrolatum, is one of the most widely used topical agents to enhance antimicrobial peptides, skin repair, and hydration.⁶⁸ The main content consists of long-chain aliphatic hydrocarbons.⁶⁹ The substance is tasteless, almost odorless, and non-irritating.⁶⁸ Trans epidermal water loss (TEWL) in healthy and irritated human skin will be regulated by petroleum jelly. Humid conditions can help cells divide, grow, and migrate rapidly to optimize the formation of new tissues.^{70,71}

In addition to pharmacological treatment, we counseled the patient on factors that may trigger lesion recurrence and disease management. We advised the patient to manage her anxiety and referred him to a mental health expert for further treatment. Dental healthcare providers should be well aware of and understand the potential risks of oral disease with trigger factors of psychological conditions. Dental healthcare providers and mental health professionals have to collaborate to enhance the psychological and oral health conditions of patients.³⁷

We also suggested minimizing sun exposure activities and advised using lip balm and sunscreen, especially on the lips. Lip balm is applied to counter moisture and hydrate the lips due to the triggering factor of prolonged sun exposure.⁷ Sunscreen provides a physical barrier that reflects and scatters light and a chemical barrier that absorbs light, which helps limit skin damage by interrupting the photochemical cascade that occurs with UV light, thus preventing the recurrence of HL by minimizing UV exposure.⁴⁶ However, male patients may need to be more compliant when using lip balm and sunscreen.²⁵

The appropriate medication administration and cooperation from the patient for executing the treatment provided resulted in no history of recurrence of HL and improvement of GT to asymptomatic. Therefore, the patient was satisfied with this treatment after it was performed. The patient also gave written consent to publish the data and images of this case report. The institution has agreed to publish this case report.

Conclusion

This case report highlights the potential relationship between anxiety, sun exposure, and the onset of HL. Understanding this relationship is critical for healthcare practitioners to know for effective management and prevention strategies. A comprehensive management approach, such as a multidisciplinary team approach, is essential to enhance quality of life and prevent HL morbidity and recurrence.

Consent Statements

The patient has approved and written informed consent for the publication of this case report, including the images. The institution has also granted its consent to publish this report.

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Disclosure

The authors report no conflicts of interest in this work.

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