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# Leaky Gut Syndrome and Oral Lesions - A Hypothesis

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***Authors' contributions***

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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***Review Article***

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## ABSTRACT

There are many oral lesions which run a chronic course and always recur despite being treated multiple times by experts. They cause tremendous damage to multiple tissues. Many oral diseases have orofacial manifestations only, while others are associated with multiple serious systemic manifestations. Various researchers across the globe have been struggling to find out permanent solutions through various therapeutic approaches like, ayurveda and holistic etc but internal root causes should be found out which might give us breakthrough quick therapies in near future.

We need to explore evidence based various hidden internal /systemic causes to achieve permanent cure of such chronic long-standing diseases.

All systems of the body are interconnected and always works in harmony. Oral diseases can never be restricted to orofacial tissues. They are strongly connected to gastro intestinal, ectodermal tissues and all the systems. This article is an attempt to find out same through few hypotheses and connecting oral lesions with other disorders.

*Keywords: Oral diseases; hypothesis; leaky gut syndrome; systemic cause; interstitial fluid; acidic.*

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## 1. INTRODUCTION

Dental literature is flooded with the description of oral lesions that have possible cause and effect relationship. When single etiological factor associated with the disease, it is very easy to apply therapeutic measures to treat that disease effectively [1]. However there are many oral diseases which are multifactorial in origin which pose challenges to clinicians to plan therapeutic measures [2]. There are wide range of diseases like dental caries, oral potentially malignant disorders, skin lesions, oral cancer etc which are multifactorial in origin [3]. Therefore these diseases have been extremely challenging to treat for healthcare providers. Researchers have been trying very hard to narrow down their search in finding out exact cause but their efforts have limited success. As we explore and study pathological alterations in these lesions we came across some initial alterations in deeper tissues of these lesions which made us to ask question "Are there systemic factors responsible for triggering most initial changes in these oral lesions which are then aggravated by external stimuli? [4]. Most of the time such initial hidden and unexplored events needs to be evaluated based on the evidences in the medical and dental literature. Leaky gut syndrome is one of the less discussed disorder which allows undigested food particles from microleaky gut to the systemic circulation. Such particles enters the tissues and evoke autoimmune, tissue acidosis and inflammatory response.

Therefore this review article is a hypothesis to connect various lesions with leaky gut .since this is a review article ethical approval wasn't considered. All the following events could be the effect of leaky gut syndrome.

## 2. DISCUSSION

We need to find out the exact root cause of oral lesions. There are few hypothesis suggested by authors as follows:

**Dental caries** - Dental caries is the most common microbial disease affecting teeth. Various theories have been advanced to explain etiopathogenesis of dental caries. (1)All of them have their own drawbacks as none of them explains as to why there are caries free individuals in spite of consuming sugars in their diet.(1)Most accepted theory is the Chemico-parasitic theory put forth by W.D.Miller which says dental caries is caused by bacteria which ferment sugars present on the tooth surface. Fermentation process leads to formation of acids and results in dissolution of enamel crystals leading to cavity formation. Therefore sandhya et al and larma et al postulated that there is additional internal systemic approach before external caries attack [5-8]. This internal attack is due to acidic interstitial fluid which flows through dental lymph through dentinal tubules and causes internal tooth porosities due to removal of minerals in an attempt to buffer acidic interstitial fluid. This is body's defence mechanism to buffer acids through calcium [6,9-12]. Such porosities will decide whether such individuals are prone to caries or not [10]. Sometimes even if porosities are more but if oral hygiene methods are good then patients would be less prone to caries attack. This acidic interstitial fluid could be related to tiny undigested microfood particles, medicaments etc. escaped through leaky gut wall.

1. **Erosion**- Erosion is considered to be wearing of tooth structure due to chemical factors. Such chemical factors are mostly cold drinks .Now the question arises whether such factors act through external or internal routes. It could also be hypothesized that once the internal porosities are formed such teeth are prone to external attack. If the attack is bacterial then caries will occur. If oral hygiene habits are good then caries occurrence will be less, but chances of erosion will be more. Patients with erosion will have good oral hygiene methods and personal hygiene too. Inspection of personal hygiene can give a clue to correlate erosion with internal porosities [13,14].

2. **Oral premalignancy**- Oral premalignancy such as OSMF, lichen planus and leukoplakia have mostly due to an external carcinogens such as tobacco, alcohol and areca nut, medicaments, filling materials etc. but when histopathological descriptions are put together in sequence then initial changes are seen in basal portion of the epithelium or the stroma [15].

In leukoplakia the cause is tobacco eating. Chewing Tobacco is always in contact of surface mucosa but resultant epithelial dysplasia always starts from basal layer instead of stratum corneum. Hyperkeratosis is just a protective mechanism against tobacco but cellular alterations starts from basal region [16].

Therefore some internal factors such as tissue acidosis due to leaky gut can be postulated.

In oral submucous fibrosis, the continuous trauma of areca nut chewing is on the surface oral mucosa but the histopathological alterations starts within stroma and it further leads to epithelial dysplasia which again starts at the basal region [17]. Continues areca nut chewing can lead to leaky gut syndrome.

Lichen planus is a mucocutaneous premalignant lesion which is caused by stress, medication, and filling materials etc. Histopathological events start at stomal level in the form of juxta epithelial dense inflammatory cell reaction, liquefaction degeneration of basal cell layer and saw tooth rete pegs, civatte bodies etc. [18,16]. Such patients are under chronic medications and stressed which is responsible for tissue acidosis and harms the gut wall too.

3. **Genetic disorders**- Genetic disorders could be due to a damage to genes through mother and transmitted to foetus [1].
4. **Joint disorders**- Such escaped molecules can easily lodge in joint spaces too and create inflammation and joint disorders [19,4].
5. **Infections**- Our body is surrounded by many microbes on the body surfaces and in the environment. Healthy and live body is a bit immune to the infections but the unhealthy and dead body is prone to microbial attack [4,20]. Microbes can easily enters the systemic circulation too.
6. **Intelligence**- When acidic intracellular interstitial fluid accumulates it leads to neuron dysfunctions too and leads to confusion and sometimes disorientation and imbalance [21,4].
7. **Weight gain**- Sometimes there is sudden weight gain in the absence of heavy eating habits , instead it occurs due to less eating habits.In such cases there is accumulation of adipose tissues around the bones and abdomen to prevent acid to withdraw bone minerals and damage the tissues in an attempt of buffering the acidity [22,23].

Question arises what could be the reason for acidic interstitial acidic ph. Literature says, emotional stress, bad eating habits, insufficient sleep, excessive exercise ,vitamin D ,iron and calcium deficiency etc. are prime causes

Such nutritional deficiency can lead to weak muscle contractions which lead to slow peristaltic movements and slow digestion .Food retains for longer in the body before excretion leads to acid accumulation and micro trauma to gut wall [24,25].

**Leaky gut syndrome and skin diseases** - It has been mentioned that if our gut is healthy we are healthy. It means if there are injuries to gut tissues due to food in terms of unhealthy ingredients and improper mastication, it leads to overload on soft tissues of the gut wall. This leads to micro trauma on the luminal wall of the gut as suggested by Alessio Fasano et al [25,26].

Our gut tissues are under constant trauma and hardly get time for self-healing. They are subjected to continuous food intake and continuous digestion. A traumatized gut will be subjected to more trauma. Alessio Fasano et al stated in his research that all diseases occur due to leaky gut syndrome [26,27].

Such micro trauma or micro perforation is called a leaky gut. Such leaky gut when subjected to food intake peristalsis starts. But some undigested tiny or micro food molecules enter the circulation through these perforations present within the lumen. These escaped undigested food molecules and perforations could be of various sizes depending on the extent of trauma and injuries [25].

It could be hypothesized that once these molecules escapes the gut wall, depending on the size of the toxic molecules. They get lodged within peripheral tissues. Bigger molecules will get lodged in deeper tissues and organs while smaller molecules reach up to most peripheral parts of body such as extremities and oral cavity specifically within the epithelium and connective tissues.

8. **Autoimmune blistering diseases-** Leaky Gut syndrome could be the base for various autoimmune blistering diseases in the oral cavity and skin with and without systemic involvement [25 ,26,28].

For example pemphigus has intraepithelial vesicle formation, pemphigoid has sub epithelial vesicle formation and other diseases have split at anchoring fibril level etc. [2].

Why does systemic lupus erythematosus have butterfly shaped inflammation on face?

It can be hypothesized that blistering diseases manifesting as deeper tissues vesicles have larger toxic molecules entered as self-antigen and diseases with intraepithelial and sub epithelial split have relatively smaller escaped food molecules. Since they have escaped digestion they evoke autoimmune response and leads to tissue destruction in the form of vesicle formation. SLE is a systemic autoimmune disease. Again there is pooling of inflammatory cells in various connective tissue zones of the body. These cells get accumulated wherever there are connective tissue present in between the parenchyma. As the facial region has Concavities on the bridge of the nasal bone and mallor bone, the amount of connective tissue is also more in this zone as compare to the adjacent bones. Therefore bilateral mallor inflammation joins at the bridge of the nose and contributes butterfly shape.

## 3. CONCLUSION

Various researchers involved in intensive care unit and ayurveda primarily ~~on~~ focus on buffering this interstitial fluid and healing the traumatic gut as therapeutic measures along with supportive and symptomatic treatment. This unexplored topic of leaky gut syndrome is thus connected to every disease and it should be researched through planned methodology in future.

## CONSENT AND ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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