



## TO EVALUATE IMMUNOMODULATORY EFFECT (Ig A) OF LICORICE ON PERIODONTAL HEALTH STATUS IN CHRONIC PERIODONTITIS PATIENTS BEFORE AND AFTER PERIODONTAL THERAPY

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**ABSTRACT** **INTRODUCTION:** Several dietary additives are reported to be effective to enhance the immune function. Licorice has been frequently used as herbal medicine to suppress inflammation. It has anti stress effects, enhance detoxification in liver and suppress inflammatory reaction and enhance the immune function.

**OBJECTIVES:** To evaluate effect of licorice on immunomodulatory (IgA) before and after SRP

**METHODOLOGY:** Twenty subjects were randomly assigned into two groups. Group A (Supplemented with licorice along with SRP). Group B (SRP Only). All the clinical parameters like gingival index, probing depth, clinical attachment level along with serum levels of Ig A were evaluated before and after SRP.

**RESULTS:** There was a statistically significant increase of Ig A levels in group A compared to group B.

**CONCLUSION:** The present study showed that licorice extract significantly effect on enhancing the immunomodulatory effect not only the periodontal health status of chronic periodontitis and also significant effect on overall health status.

**KEYWORDS :** licorice, immunoglobulins, chronic periodontitis, immune system, periodontal therapy, immunomodulatory effect.

### 1. INTRODUCTION

Periodontal disease (PD) is an inflammatory process involving innate and adaptive immune responses characterized by the irreversible loss of connective tissue attachment and supporting alveolar bone. To an esthetically and functionally compromised dentition.

Periodontal Diseases are initiated by bacteria that colonize the tooth surface and gingival sulcus, and the host response is believed to play an essential role in the breakdown of connective tissue and alveolar bone, which are the key features of the disease process<sup>(1)</sup>. An intermediate mechanism that lies between bacterial stimulation of host immune system and tissue destruction is the production of cytokines, which stimulates inflammatory events that activate effector mechanisms. These cytokines can be characterized as chemokines, innate immune cytokines and acquired immune cytokines.<sup>(2)</sup>

The main mechanism of humoral immunity is opsonization by immunoglobulin. Cellular immunity is mainly characterized by cytotoxic T cell-induced apoptosis of target cells. T cells can be categorized into two major type groups: helper T cells (CD3 and CD4+ as the surface markers) and cytotoxic T cells (CD3 and Cd8+) (Germer et al. 2009).<sup>(3)</sup> Various growth factors and hormones, including cytokines, regulate the functions of these immune related cells. The representative cytokines interleukin (IL)-4 and IL-10 are related to humoral immunity, and IL-2 and interferon (IFN)- $\gamma$  are known to be related to cellular immunity (Murtaugh et al. 2009)<sup>(4)</sup>. The immune function is tightly connected to inflammatory reaction because the latter is induced by activation of immune cells in the local tissues. Therefore, inflammatory reaction can be regulated by the expression of cytokines, such as IL-1b, IL-6 and TNF- $\alpha$ , which are characterized as the representative pro-inflammatory cytokines.

Several dietary additives are reported to be effective to enhance the immune function.<sup>(5,6)</sup> Licorice has been frequently used as a herbal medicine to suppress inflammation, licorice root is the herb which has been integral part of Chinese medicine and Ayurveda for centuries. It is sweet, moist, soothing herb that belong to the glycyrrhiza species. It has the beneficial effect in the treatment of various diseases such as cancer, tuberculosis, gastric ulcers, immunodeficiency. Recently the benefits of licorice in oral disease has been great interest. Licorice and its metabolites in preventing and treating various oral disease such as dental caries, periodontal disease, candidiasis, aphthous ulcer. It has been used as a root canal medicament which can prevent failed root canal therapies and lead to success rate of the treatment.<sup>(7,8)</sup>

The aim of the present study was to evaluate the effect of licorice in immunomodulation of chronic periodontitis patients.

### 2. MATERIALS AND METHODS:

Twenty subjects aged between 20-60 years of age were selected from the outpatient segment from the Department of periodontics, St. joseph dental college, india. All 20 subjects fulfilled the following criteria.

#### 2.1 INCLUSION CRITERIA

- Age limit and
- systemically healthy patients who were eligible to participate in this randomized clinical trial.

#### 2.2 EXCLUSION CRITERIA

- The patient with a history of periodontal treatment with in the past 6 months.
- Patient under any medication.
- Patient who have under medication.
- Pregnancy and lactation.
- History of viral infection in past 6 months.

Subjects fulfilling the selection criteria were chosen successfully and ethical clearance was obtained from the institutional review board. Admissible information regarding the study protocol was elucidated to each patient, written informed consent was obtained from all participants. Initially the deepest pocket is measured using acrylic stent.

The following parameters were recorded: Gingival index (GI) (Loe and silness 1963) Probing pocket depth (PPD) measured with Williams periodontal probe), clinical attachment level (CAL) (measured from a fixed point i.e cement enamel junction).

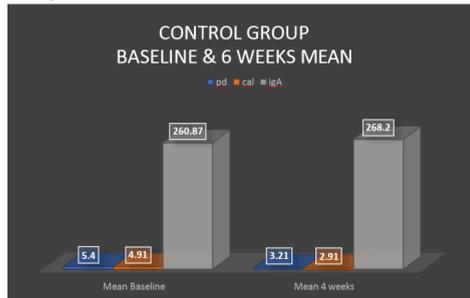
5 ml of blood samples are collected from anti cubital vein of all two groups (group A, group B) at baseline and recalled after 6 weeks for assessment of parameters. serum is separated by centrifugation and stored at -4 degree centigrade and it is transferred to lalpath labs for further evaluation of antibody titre (IgA).

### 3. STATICAL ANALYSIS:

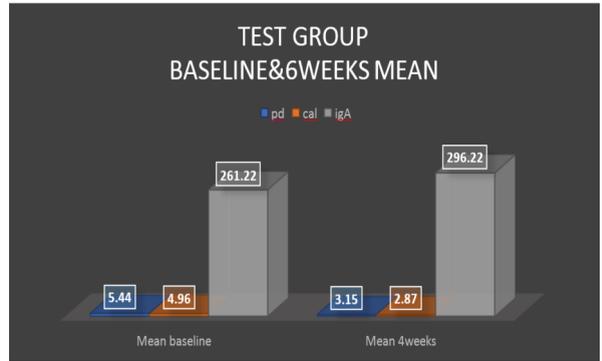
The paired t -test is used for intragroup comparison using software SPSS version 20.

### 4. RESULTS:

There was a statistical significant reduction in the mean values of gingival index, clinical attachment level, probing pocket depth, and increase in Ig A levels.



Graph 1: Mean Values Of Pd, Cal, Ig A Of Group A At Baseline And 6 Weeks



Graph 2: Mean Values Of Pd, Cal, Ig A Of Group B At Base Line And 6 Weeks.

Table 1: Comparative Evaluation Of Pd, Ccal, Ig A Of Group A And Group B At Base Line And 6 Weeks.

	Group1 mean±sd		Group Mean		P value		significant		d.f	
	baseline	6weeks	baseline	6weeks	baseline	6weeks	baseline	6weeks	baseline	6weeks
PD	5.42±0.054	3.15±0.03	5.4±0.023	3.21±0.038	0.326	0.019	P>0.05	P<0.05	15	15
CAL	4.96±0.044	2.87±0.04	4.91±0.061	2.87±0.040	0.051	0.035	P<OR=0.05	P<0.05	15	15
IGA	261.22±27.15	296.22±19.4	260.87±29.60	268.25±19.4	0.025	0.034	P>0.05	P<0.05	15	15

**DISCUSSION:**

Licorice is obtained from the unpeeled, dried roots and stolons of two different plants: Glycyrrhiza glabra and Glycyrrhiza uralensis. Both plants were well-studied and contain different metabolites.<sup>(9)</sup> Periodontal diseases including periodontitis and gingivitis are chronic infections with two major etiological factors including by gram-negative anaerobic bacteria and the interaction of these bacteria with host immune system.<sup>(10)</sup> The most putative pathogens associated by periodontal diseases are *P. gingivalis*, *Tannerella forsythia* and *Treponema denticola* for chronic forms of periodontitis and *Aggregatibacter actinomycetemcomitans* in aggressive forms.<sup>(11)</sup>

In vitro studies have shown that licorice and its bioactive ingredients may have potential to be used as phytochemical drugs and can be used as a natural modality to cure periodontal disease.<sup>(11)</sup> It has been shown that licorice can affect both etiologic factors in periodontal diseases. An in vitro study had shown that *G. uralensis* can inhibit the growth and biofilm formation of *P. ginigivalis*.<sup>(11)</sup> Licorice can also affect the host inflammatory responses.

Bodet *et al.*<sup>(12)</sup> found that pre-treatment of human macrophages with licorice extract before stimulating them with *A. actinomycetemcomitans* or *P. gingivalis* LPS decreases the secretion of pro-inflammatory cytokines (interleukin [IL]-1β, IL-6, IL-8 and tumor necrosis factor-α), which shows the anti-inflammatory effect of licorice on immunologic system.

Sasaki *et al.*<sup>(13)</sup> showed in an in vitro study that 18β-glycyrrhetic acid (a metabolite of licorice) can suppress the LPS and receptor activator of nuclear factor kappa-B ligand (RANKL) induced phosphorylation of Nuclear Factor Kappa B (NF-KB) P105 and showed that licorice can modulate host immunessystem response. In particular, mucosal IgA has a role in protecting the mucosal epithelial cells from infection by bacteria and neutralizing bacterial toxin (Fagarasan&Honjo2004).<sup>(14)</sup> Increased IgA production in the mucosa is thus expected to enhance the immunity of the digestive organs, which is related to the prevention of infectious diseases (Fujihashi & Kiyono 2009).<sup>(15,16)</sup>

The present study showed statistically significant reductions in mean values of all clinical parameters (GI, PPD, CAL) from baseline to 6 weeks in both the groups with a more significant reduction in group B & increase in Ig A levels from baseline to 6 weeks.

The stimulation of liquorice on IgA production has been observed in other studies, carried out by (Fujihashi & Kiyono 2009) showing that liquorice can increase blood levels of IgA, IgG and IgM, improving the immunity.

**6. LIMITATIONS:**

Some limitations of this study were the incompletion of patients during the study, since the time of drug usage was long and some

patients said they forgot to take some dosages of their drugs. According to previous in vitro and in vivo studies on therapeutic effects of licorice and the results of the present study, it seems legitimate to say that licorice extract is a herbal drug which doesn't have the side-effects of a chemical drug, so it seems reasonable to use it as an addition or a replacement to the chemical drugs used to treat periodontal diseases.

**7. CONCLUSION:**

This study showed an increase in IgA levels after the administration of licorice along with SRP showed that there could a positive correlation between licorice, chronic periodontitis. Present study showed an enhanced effect on the immune function by the dietary addition of licorice, which were detected in the peripheral blood and mucosa. Furthermore, the data presented in this study indicate that the dietary addition of licorice induced the enhancement of mucosal immunity and anti-inflammation effect in the peripheral tissues. This study suggests that the dietary addition of naturally derived compounds such as and licorice are effective in improving the immune function.

**8. CONFLICT OF INTEREST:**

NIL.

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