

Evaluation of Serum Titres of Human Cytomegalovirus (HCMV) In Apical Periodontitis Before and After Phase I Therapy

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Abstract

Background: Human cytomegalovirus has been postulated to be associated with periodontitis. Immunoglobulins G (Ig G), Immunoglobulin (Ig M) are two antibodies produced by human body against HCMV. Ig G is formed and elevated during active infection, whereas Ig M is elevated during their intial infection stage. In this study we compared and evaluated the serum titres of Ig G, Ig M against HCMV in apical periodontitis patients before and after scaling and root planing and root canal therapy.

Aim: The present study is to evaluate the serum titres of antibodies viz: immunoglobulin G (IgG), Immunoglobulin M (IgM) against HCMV in apical periodontitis before and

after scaling and root planning (SRP) and root canal therapy (RCT).

Methodology: Ten subjects were assigned with apical periodontitis. All clinical parameters like GI, PI, PPD, CAL & biochemical parameters like serum titres of IgG, IgM antibodies levels were evaluated at baseline and four weeks.

Results: The study showed a significant reduction in mean values of IgG .There is no significant reduction in Ig M values.

Conclusion: Within the limitations of the study, there is a significant relation of viral titres and periodontal diseases. Increase in IgG values before SRP and their value reduction after SRP and RCT showed the positive correlation of viral titres and periodontitis.

Keywords: HCMV, Apical periodontitis, Immunoglobulin G, Immunoglobulin M antibodies.

Introduction

Periodontitis is a multifactorial, polymicrobial disease wherein connective tissue destruction was brought about by inducing an alteration in host immune responses. Various studies had been proposed the role of the virus as an etiological agent in the pathogenesis of periodontitis (1,2,3). Apical periodontitis is essentially a polymicrobial inflammation caused by opportunistic endodontic bacteria, but other microbes, such as human cytomegalovirus (HCMV) and Epstein bar virus (EBV) can play a pathogenic role. (4-8) Morgan first reported the role of HCMV in 1983 in a case of necrotising periodontitis of HIV infected person. Conterars and Slots have demonstrated the HCMV role in the initiation and progression of periodontitis in 1998. HCMV belongs to the family Herptoviridae commonly known as Human Herpes Virus 5 (9).

HCMV establishes latent infection in CD34+ bone marrow myeloid progenitor cells, dendritic cell (DC) precursors, and Monocytes. During periapical inflammation, there is an influx of leukocytes, of which the mononuclear cells may carry latent herpesviruses. The local environment may allow Herpesviral activation from the inactive latent phase. In HCMV, the differentiation of infected monocytes into tissue macrophages or the maturation of infected dendritic cell follows the latent infection reactivation. The infectious virions which are released are capable of infecting further macrophages, T lymphocytes, endothelial cells, and connective tissue cells. (10)

IgG, IgM are two antibodies produced by the human body against HCMV. IgG is formed and elevated during an active infection, whereas elevated levels of IgM is seen during the initial infection stage.

HCMV triggers the release of proinflammatory cytokines that have the potential to activate osteoclasts and matrix metalloproteinases and to impair antibacterial immune mechanisms, causing an up-growth of periodontopathic bacteria. It targets endothelial, ductal epithelial cells, gingival monocytes/ macrophages, T-lymphocytes by inducing abnormalities in adherence, phagocytic, chemotaxis, oxidative, secretory, and bactericidal activities of polymorphonuclear Neutrophils(11).

This study aims to determine the evaluation of serum titres of human cytomegalovirus (HCMV) in apical periodontitis before and after phase 1 therapy and endodontic treatment.

Materials and Methods

Ten apical periodontitis subjects aged between 20-50 years of age were selected from the outpatient segment from the department of periodontics, st joseph dental college, India. The inclusion criteria were as follows: individuals in good health with no severe systemic disease, and had not received endodontic treatment or antibiotics for 3months before the start of the study. The patients with a history of periodontal therapy within past 6months, under any medication, patients who have a smoking habit, pregnant and lactating mother and with history of any viral infection in past 6months were excluded from the study.

Symptomatic lesions of apical periodontitis were characterized by acute pain, discomfort on biting, sensitivity by percussion, or palpation at the apical region of mucosa and final radiographic diagnosis in done.

Subjects fulfilling the selection criteria were chosen successively, and ethical clearance was obtained from the institutional review board. Admissible information regarding the study protocol was elucidated to each patient and written informed consent was obtained from all

participants. Initially, the deepest pocket is measured using an acrylic stent.

The following parameters were recorded: Gingival index [GI] (Loe and Silness, 1963), Probing Pocket Depth [PPD] (measured with Williams periodontal probe), and Clinical Attachment Level [CAL] (measured from a fixed reference point i.e. Cemento enamel junction).

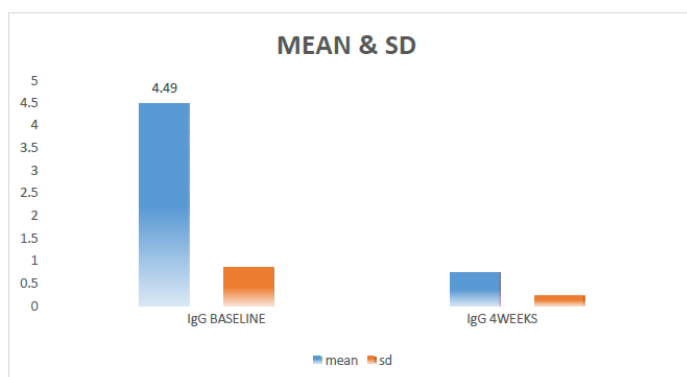
5ml of blood samples are collected from anti cubital vein of all the ten subjects at baseline and recalled after one month for assessment of parameters. It is transferred to labs for further evaluation of antibody titres {IgG and IgM} of HCMV, which is done through solid- phase immune assay ELISA.

Statistical Analysis

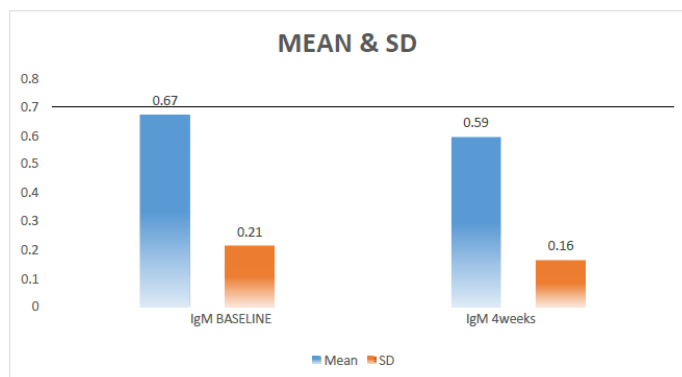
The paired t-test is used for intragroup comparison using software SPSS version 20.

Results

There was a statistically significant reduction in the mean values of gingival index, clinical attachment level, probing pocket depth and serum titres of IgG. There was no significance of IgM when compared to IgG.



Graph 1: Mean and SD Of IgG At Baseline And 4weeks



Graph 2: Mean and SD of Igm At Baseline And 4weeks

Group	N	Mean	Std. Deviation	Std. Error Mean
IgG	Baseline	4.498000	.8585492	.2714971
	4weeks	.752000	.2457099	.0777003
IgM	Baseline	.6740	.20603	.06515
	4weeks	.5990	.16333	.05165

Table 1: Comparative Evaluation of Igg, Igm Levels At Baseline And Four Weeks

	Mean±sd	t-value	d.f	p-value	Significance
IgG BASELINE	4.49±0.85	13.265	18	0.003	P<0.05
IgG 4WEEKS	0.75±0.24				
IgM BASELINE	0.67±0.20	0.902	18	0.379	P>0.05
IgM 4WEEKS	0.59±0.16				

Table 2: Comparative Evaluation of Igg, Igm Levels At Baseline And Four Weeks.

Discussion

Recently, some studies suggested the role of HCMV in periodontitis(12,13,14). Studies regarding saliva, Gingival crevicular fluid antibody titres have been done. So, far very few studies are done evaluating the serum titres of

antibodies against HCMV. Serum titres are preferred in the study as it is usually used for the detection of active phases of apical periodontal disease. With the arrival of highly sensitive techniques, traces of markers can be accurately established in Serum. It has no contamination during colonisation, translocation and migration, it can predictably be used as a biomarker.

HCMV exhibits marked tropism for cells of the immune system, it modulates antigen presentation in the Major histocompatibility class I and II pathways, it also shows the direct cytopathic effect on inflammatory cells stimulating the release of cytokines and chemokines which impairs the periodontal immune defence. So, it helps in enhancing the virulence of already resident bacteria(15). There is a significant reduction in GI & PI values in apical periodontitis subjects from baseline to 6weeks. There was significant reduction in the PPD and gain in CAL from baseline to 6weeks.

Bacteria are by far the most common microorganisms involved in endodontic infections, studies have revealed a possible role for fungi and more recently for viruses. Sabeti et al. using RT-PCR, identified HCMV transcripts in periapical granulomatous tissues and detected that herpes viruses in large symptomatic periapical lesions at a higher incidence. Yildirim et al. demonstrated the presence of herpesviruses and bone resorption-inducing cytokines in periapical lesions of deciduous teeth. Using an immunohistochemical approach, Saboia-Dantas et al. identified HCMV in apical periodontitis lesions, with higher prevalence in HIV-positive patients(16).

At the baseline, viral titres of serum IgG are increased [normal values 0.8-1.20 odds ratio] in all the ten subjects. The increased serum IgG values indicated the active infection of cytomegalovirus. At the baseline, viral titres of serum IgM were within normal limits {0.9-1.10 odds ratio} in all the ten subjects could be attributed to the fact

that IgM antibodies are the first to be produced by the body in response to an HCMV infection.

There was a significant reduction in serum titres of IgG, values in all the ten subjects after SRP and root canal therapy. The decreased serum IgG values could be attributed to SRP and RCT, could have played an effective role in reducing the amount of viral load. The above results are in accordance with the study done by Grenier et al 2009(17) who found a reduction in the scores of HCMV, EBV and HSV after SRP. There is no significant reduction in IgM values this could be attributed to no latent infection of this virus which was in accordance with Contreras *et al.*, 1999.

Conclusion

Within the limitations of the study, An increase in IgG values after treatment showed that there could be a positive correlation between viral titres and apical periodontitis and these could be used for assessment, evaluation, monitoring periodontal and general health status. However, longer duration with larger samples are Further Needed.

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