Relationship between Herpes Simplex Virus Type-1 and periodontitis

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ABSTRACT

Background: HSV-1 is responsible for the most commonly occurring viral infections of the mouth and perioral soft tissues, HSV-1 which primarily is associated with oral and labial lesions, and it causes a recurrent infection, which commonly occurs in the mouth. Additionally, HSV infection has been associated with periodontitis. The HSV-1 may cause periodontal pathosis as a direct result of virus infection and replication, or as a consequence of virally induced impairment of the periodontal immune defense, resulting in heightened virulence of resident bacterial pathogens. The aims of the study are to show the relationship between HSV-1 and periodontitis, and to determine HSV-1 Antigen in saliva of periodontitis patients by immunofluorescent, as well as to determine HSV-1 antibodies immunoglobulin G (IgG) in saliva samples by enzyme linked immunosorbent assay (ELISA) test.

Materials and methods: Thirty periodontitis patients and thirty periodontitis patients and have recurrent herpes labials (RHL) compare with thirty healthy control subjects were included in this study. Saliva samples were taken from all subjects (patients and healthy) and examined by direct immunofluorescent and ELISA test. Two swabs from patients with oral herpes labials were considered as a positive control.

Results: The present study indicated that there is relationship between HSV-1 and periodontitis and the herpes simplex virus type-1 was detected in periodontitis patients by ELISA and immunofluorescent method.

Conclusion: The study revealed positive association between HSV-1 and periodontitis and the virus may play a role in the pathogenesis of the periodontitis.

Key words: HSV-1, periodontitis, ELISA, direct immunofluorescent, Saliva. (J Bagh Coll Dentistry 2011;23(1):146-150)

INTRODUCTION

Herpes simplex virus type-1 is a large enveloped DNA virus and significant human pathogen. It infects most persons early in life, primarily at mucosal surfaces following exposure to infected secretions, and causes a range of diseases from labialis and stomatitis to blinding keratitis and rarely encephalitis (1). HSV-1 is a nuclear replicating enveloped virus, usually acquired through direct contact with infected lesions or body fluids typically saliva (2). Oral infection caused by the herpes simplex virus represents one of the more common conditions the dental practitioner will be called upon to manage. Unique in its ability to establish latency and undergo subsequent recurrence, it is an ubiquitous infectious agent for which a cure does not exist (3). HSV infection may promote infection by periodontal pathogens (4).

Antibodies against viruses and viral components can be detected in saliva and can aid in the diagnosis of acute viral infections, congenital infections and reactivation of infection (5).

Periodontitis is a chronic inflammatory disease, the disease is measured by the presence of periodontal pockets exceeding 4-mm depth on an average of three to four teeth (6). Herpesviruses may be related to the etiology of aggressive periodontitis (AgP) and chronic periodontitis (CP) by triggering periodontal destruction or by increasing the risk for bacterial infection (7). It seems clear that periodontal tissue breakdown occurs more frequently and progresses more rapidly in herpesvirus-infected than in herpesvirus-free periodontal sites (8). Reactivation of herpesviruses from latency may occur spontaneously or during periods of impaired host defense, resulting from immunosuppression, infection, physical trauma, hormonal changes. Herpesvirus-activating factors are also known risk factors / indicators for periodontal disease (9). The aims of the study are to show the relationship between HSV-1 and periodontitis, and to determine HSV-1 Antigen in saliva of periodontitis patients by immunofluorescent, as well as to determine HSV-1 antibodies immunoglobulin G (IgG) in saliva samples by enzyme linked immunosorbent assay (ELISA) test.

MATERIALS AND METHODS

Ninety Iraqi individuals were included in this study design with diagnostic periodontitis.

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without systemic disease and had no received periodontal treatment in past three months from periodontic department/ college of dentistry /University of Baghdad.

The measurements were made on three groups: one healthy control group and two patients groups. The age group (30-45) and the sample include males and females. 30 periodontitis patients without RHL and 30 periodontitis patients with RHL, compare with normal healthy individuals (thirty) without any history of RHL. The patients have periodontal pocket greater than 4mm. measure from the gingival margin to the apical extension by the periodontal probe. Five mls of whole unstimulated saliva were collected from all participants using plastic test tubes. Subjects were asked to refrain from eating, drinking, chewing and smoking one hour prior to donation of saliva. Saliva then centrifuged at 1000 rpm for 10 minutes; this was done within 1hour after collection to eliminate debris and cellular matter, the supernatants were aspirated immediately into two pre labeled epndroof tube and stored frozen at (-20°C) until assayed.

RESULTS

ANOVA test (Table 1) showed that there was statistically significant differences among all the groups at the P value 0.003 in the mean of anti HSV-1 IgG Abs in periodontitis patients was (24.3804 Hu/ml) and in periodontitis patients with RHL the mean was (24.3270 Hu/ml) which is higher than mean in healthy control group (15.5797 Hu/ml).

The direct immunofluorescent method showed cells producing HSV-1 specific antigen, which was identified by the cytoplasmic apple-green fluorescence which is considered as a positive results, which it was taken from patients having herpes labialis, while when there is no specific fluorescence it will considered as a negative one. Regarding healthy control group 8 (5 males and 3 females) show positive reaction and 22 (7 males and 15females) show negative reaction.

Table 1: The difference In mean of anti HSV-1 IgG Ab among study groups

<table>
<thead>
<tr>
<th>IgG</th>
<th>healthy periodontitis</th>
<th>periodontitis with RHL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.</td>
<td>5.83</td>
<td>7.17</td>
</tr>
<tr>
<td>Max.</td>
<td>33.41</td>
<td>56.22</td>
</tr>
<tr>
<td>Mean</td>
<td>15.5797</td>
<td>24.3804</td>
</tr>
<tr>
<td>S.D.</td>
<td>7.63796</td>
<td>14.04092</td>
</tr>
<tr>
<td>S.E. of mean</td>
<td>1.39450</td>
<td>2.56351</td>
</tr>
<tr>
<td>No.</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

P-value =0.003  S.  * The difference is significant at the 0.005 level.  D.f. =2

Figure 1: The difference In mean of anti HSV-1 IgG Ab among study groups

The results of direct immunofluorescent are summarized in table 2 showed that 14 periodontitis patients (11 males and 3 females) revealed positive reaction, while 16 (10 males and 6 females) revealed negative reaction.21 periodontitis patients with RHL shows positive reaction (7 males and 14females), on the other hand the negative results in this group show 9 (1 male and 8 females).
Table 2: The distribution of sample according to I.F. results

<table>
<thead>
<tr>
<th></th>
<th>+ve IF</th>
<th></th>
<th>-ve IF</th>
<th></th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M  F</td>
<td>total</td>
<td>M  F</td>
<td>total</td>
<td></td>
</tr>
<tr>
<td>healthy</td>
<td>5  3</td>
<td>8</td>
<td>7  15</td>
<td>22</td>
<td>$\chi^2=2.301 \ P=0.129$ N.S.</td>
</tr>
<tr>
<td>periodontitis</td>
<td>11  3</td>
<td>14</td>
<td>10  6</td>
<td>16</td>
<td>$\chi^2=0.918 \ P=0.338$ N.S.</td>
</tr>
<tr>
<td>Periodontitis with RHL</td>
<td>7  14</td>
<td>21</td>
<td>1  8</td>
<td>9</td>
<td>$\chi^2=1.591 \ P=0.207$ N.S.</td>
</tr>
</tbody>
</table>

* The difference is significant at the 0.005 level.

D.f. = 1

Figure 2: Positive immunofluorescent in periodontitis patients with RHL showing large cells with ballooning degeneration

Figure 3: Negative immunofluorescent in periodontitis patients with RHL

Figure 4: The distribution of healthy control group according to I.F. results
DISCUSSION

The results of ELISA test may refer to a relationship between increase level of anti HSV-1 IgG in saliva of periodontitis patients and prevalence of disease. Present findings are in agreement with Gilbert (10) who observed that reactivation of HSV-1 can result in recurrent herpes labialis lesions (RHL) and in oral shedding of virus. The majority of RHL patients shed viral DNA. Shedding occurred before and after the appearance of clinical lesions. The present study agreed with Vilkuna-Rautiainen et al (7) results from multivariate logistic regression analysis on antibody levels against periodontal pathogens and HSV support an independent association between herpes virus and periodontitis infections also they concluded that antibody levels to HSV, were determined by ELISA, HSV infection may promote infection by periodontal pathogens. The infection burden was evaluated using combined IgG antibody response to periodontal pathogens and HSV as a joint variable. More specifically, high levels of IgM are consistent with acute infection; while elevated levels of IgG are suggestive of a chronic infection. Intraoral viral shedding, however, persists for several weeks after clinical resolution (11).

The presence of anti HSV-1 IgG in saliva of healthy individuals may be attributed to the fact that healthy individuals are known to shed herpes viruses (12). The findings of immunoflourscent results in the present study showed positive results in healthy control group could be attributed to asymptomatic shedding of HSV-1 in oral cavity which tended to be frequent and episodic.

Asymptomatic shedding is generally defined as the presence of HSV in the absence of clinical lesions (13).

In this study the results revealed positive association between HSV-1 and periodontitis and the virus may play a role in the pathogenesis of the periodontitis.

REFERENCES

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