

Evaluation of gingival immunoglobuline G . level in gingival blood from health to gingivitis

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الخلاصة

بما أن الجسيمات المناعية المضادة من نوع ج (IgG) تلعب دوراً مركزياً في العملية المناعية في التهابات اللثة، فإن دراسة التطوير الكمي لهذه الجسيمات من الحالة الصحية للثة إلى الحالة المرضية وبالعكس تكون أساسية للحصول على صورة واضحة من أهمية هذه الجسيمات. إن المقياس المناعي الليزري الضوئي قادر على إعطاء القياس الكمي للمركب المناعي Immune Complex عندما تتحد الجسيمات المناعية (IgG) مع مضاداتها Anti IgG لتكوين مركب مناعي قابل للقياس المختبري. أخذت الأنموذجيات الدراسية من الدم اللثوي في الحالة الصحية ثم المرضية ومن ثم بعد العودة إلى الحالة الصحية بعد العلاج ودرست لنحصل على نتائج تظهر بأن الجسيمات المناعية (IgG) تزداد كميتها في دم اللثة بصورة قياسية وبدلالة علمية كلما تطور المرض في اللثة بصورة قياسية وبدلالة علمية كلما تطور المرض في اللثة وتنحسر كميتها مع انحسار المرض بعد العلاج. مع التوجيه بأن دراسة التطور المناعي في دم اللثة قد يعطي صورة مقربة وواضحة للتفاعلات المناعية النوعية والكمية التي تتزامن مع تطور التهابات اللثة.

ABSTRACT

As the immunoglobulin G. play a central role during the immunologic process of the gingival inflammation ,the evolution of its quantity from health condition to gingivitis and visa-versa , seemed to be essential to have a Clear picture about its importance .The immunonephelometer-laser ,able to quantify the amount of immune complex , when a specific antibody anti IgG is used to form a measurable immune complex in vitro . Sampling the gingival blood in health, diseased, then reversed to health conditions gave a suggesting result that the IgG amount progress in faible significant positive correlation with the degree of gingival inflammation, the conclusion suggest that the gingival blood could give a close-clear picture of the evolution and quantification of immunoglobulin elements, and that the IgG amount progress positively with the disease progression .

INTRODUCTION :

It is agreed in these years that the gingival diseases are initiated by the bacterial challenges through their presence as an antigen and/or mitogen. Equally through the activation of immune system⁽¹⁾ . Much of the supports for the assumption that the immune responses to dental plaque bacteria is of importance in the progression of periodontal diseases has been derived from the studies of the change which occurs in the inflammatory infiltrate during the course of the disease⁽²⁾. In the clinically healthy gingiva as the Lymphocytes cell are present as a normal constituents of defending cells , the immunoglobulin are also present but in a negligible amounts in both tissues and gingival fluid⁽³⁾ .

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As the disease progress, the amounts of Lymphocytes increase in quantity⁽⁴⁾, most of them are of T type (about 75%) but during the progression of the disease, the B cells as well as the plasma cells, which originated from B cells, become more predominant, these cells are mainly IgG producing cells⁽⁵⁾. The single radial immunodiffusion studies of the gingival crevice fluid showed that the concentration of IgG varies according to the degree of gingival inflammation. This immunoglobulin is of blood serum origin⁽⁶⁾. Further immunofluorescent immunologic studies exhibit that the IgG is a characteristic immunoglobulin of chronic inflammation, so that it is termed as a secondary type⁽⁷⁾. Other evidences given suggested that during the gingival inflammation, the antigen antibody reactions occur in the gingival tissue just adjacent to the plaque inner surface, thus the gingival blood seems to be incorporated in the immune response more actively than the rest of circulating blood⁽⁸⁾. These immunoglobulins of gingiva could be specific monoclonal as a result of Antigenic activation or non specific polyclonal as a result of mitogenic activation⁽⁹⁾.

The aim of this study is to :

1. Seeking a correlation between the degree of gingival inflammation and the amount of IgG in the gingival blood.
2. Following IgG variation from health to disease and visa-versa.

MATERIALS AND METHODS :

20 dental students (10 male and 10 females) have been selected with good oral hygiene, clinically absence of gingival inflammation according to Gingival bleeding index (GBI)⁽¹⁰⁾. The upper anterior region has been chosen as area of sampling the gingival blood. A capillary tube with constant volume 10 ul has been used to collect blood from gingival papillae after picking the papilla superficially at the inner side of gingival sulcus at the Cole-De-Sac place. Area of sampling blood has been isolated with absorbent paper strips inserted all around the tooth, inside the sulcus, and a cotton wool placed sublabially around the area. 7 capillary tubes (total :70 ul) of each patient collected and diluted up to 1/40 in physiologic fluid in a conical test tube, these preparations will be centrifuged at 5000 rpm in order to exclude the cellular elements.

70 ul + 2730 ul = 2800 ul 70 ul of gingival blood + 2730 ul of transparent physiologic solution equal to 2800 ul.

The immuno-nephelometer, auto meter unit⁽¹¹⁾ able to measure the agglutination particles of Ag - Ab complex in a liquid media by means of a Laser ray which diffused in the medium and deflected in angle $0 < \theta < 90^\circ$ then reflected to a sensible screen which can measure the difference in loss of laser ray, this difference gives the amount of immunoglobulin present. Specific antiserum anti immunoglobulin G has been used. 3 samples have been taken, the first when the average BGI was 0.202 ± 0.012 , healthy gingival, excellent oral hygiene, regular daily brushing with the usage of oral antiseptic mouth wash. The 2nd sampling of gingival blood has been taken from the same patients, at the same areas, the patients had been advised and supervised to withdraw the brushing procedure for 25 days the clinical examinations revealed that the BGI became 1.42 ± 0.23 as average. The 3rd sampling has been taken 25 days after restoring the oral hygiene procedure, full mouth ultrasonic scaling has been performed, daily brushing and antiseptic mouth washes has been advised and used (chlorhexidine 0.12%), the average GBI was 0.76 ± 0.045 . All clinical signs of gingival were reversed to health.

RESULTS :

Table (1) reveals that the average GBI score were 0.202 ± 0.012 in the first sampling, then significantly increased up to average 1.42 ± 0.23 in the 2nd sampling. After restoring the oral hygiene control procedures, the GBI score decreased insignificantly to the level of average 0.761 ± 0.046 .

The evolution of immunoglobulin count in the gingival blood were insignificantly increased in the 2nd sampling and then insignificantly decreased in the 3rd sampling . the average value of IgG in the first sampling were 10.4323 ± 1.15 G/L the 2nd sampling become as average 10.7982 ± 1.13 G/L while in the 3rd sampling become as 10.3541 ± 1.045 G/L This weak evolution takes almost the same curve of gingival bleeding index (Table – 1) .

Table 1 . Measurement* of immunoglobulin in gram per liter , normal human finding is 12 gram per liter .

Patient No.	1 st sampling		2 nd sampling		3 rd sampling	
	Gingival Bleeding Index	Immuno-globulin G	G.B.I	IgG	G.B.I	IgG
1	0.12	11.228	1.5	11.828	0.61	11.437
2	0.15	10.886	1.2	10.991	0.72	10.969
3	0.14	11.647	1.3	11.711	0.25	11.036
4	0.15	10.017	1.2	10.789	0.55	10.154
5	0.12	9.177	1.4	9.774	0.21	9.577
6	0.16	8.990	1.5	9.146	0.56	9.005
7	0.10	11.850	1.5	11.925	0.61	11.023
8	0.2	12.008	1.5	12.733	0.64	12.117
9	0.4	11.501	1.2	11.723	0.81	11.285
10	0.4	10.125	1.4	10.595	0.7	10.146
11	0.10	11.488	1.7	12.224	0.29	11.888
12	0.12	10.204	1.6	10.331	0.19	10.459
13	0.13	9.716	1.5	9.889	0.18	9.671
14	0.5	11.73	1.1	11.98	0.7	11.112
15	0.4	10.617	1.9	10.819	1.2	10.114
16	0.26	8.369	0.9	9.311	1.5	8.808
17	0.09	10.794	1.7	10.989	1.6	10.357
18	0.1	10.510	1.3	10.848	1.4	10.123
19	0.3	9.591	1.5	9.791	1.3	9.742
20	0.1	8.202	1.5	8.567	1.2	8.019
	0.202_0.012	10.432_1.15	1.42_0.23	10.798_1.13	0.761_0.046	10.354_1.045

*Measurement of gingival inflammation degree based upon the Gingival Bleeding Index of Ainamo and Bay 1975⁽¹⁰⁾.

Even it is insignificant in its evolution , but it can give a picture that the amount of immunoglobulin G in the gingival blood follows the severity of inflammation , this may suggests that the IgG amount is influenced by the evolution of the disease progression . This suggestion based on the statistical finding that the correlation between IgG amount and the GBI score were positive but significantly faible ($p < 0.05$) (Fig – 1) (Fig – 2) .

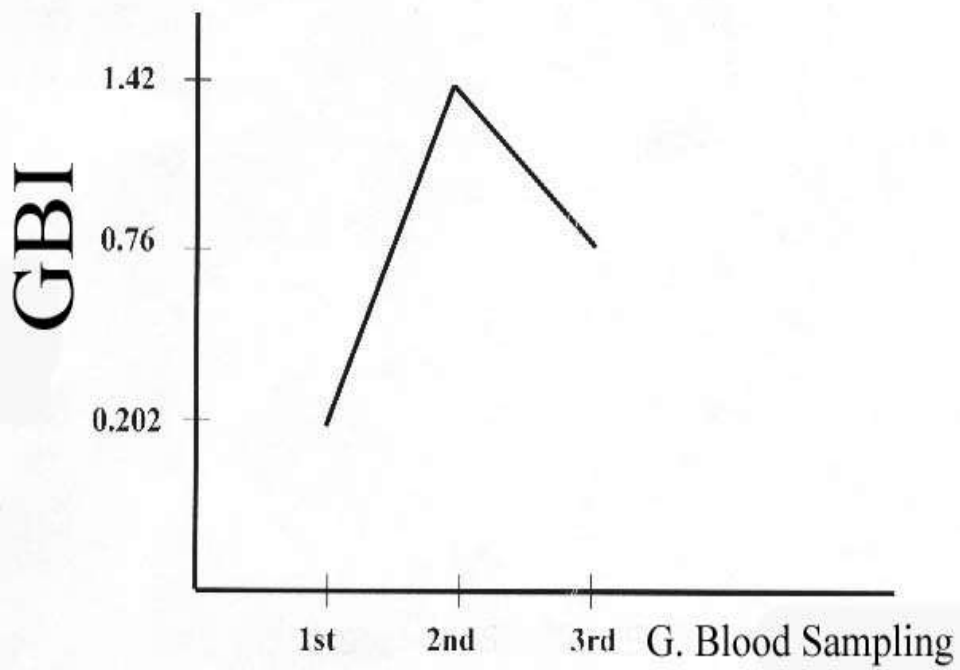


Fig .1. -: Evolution of GBI.

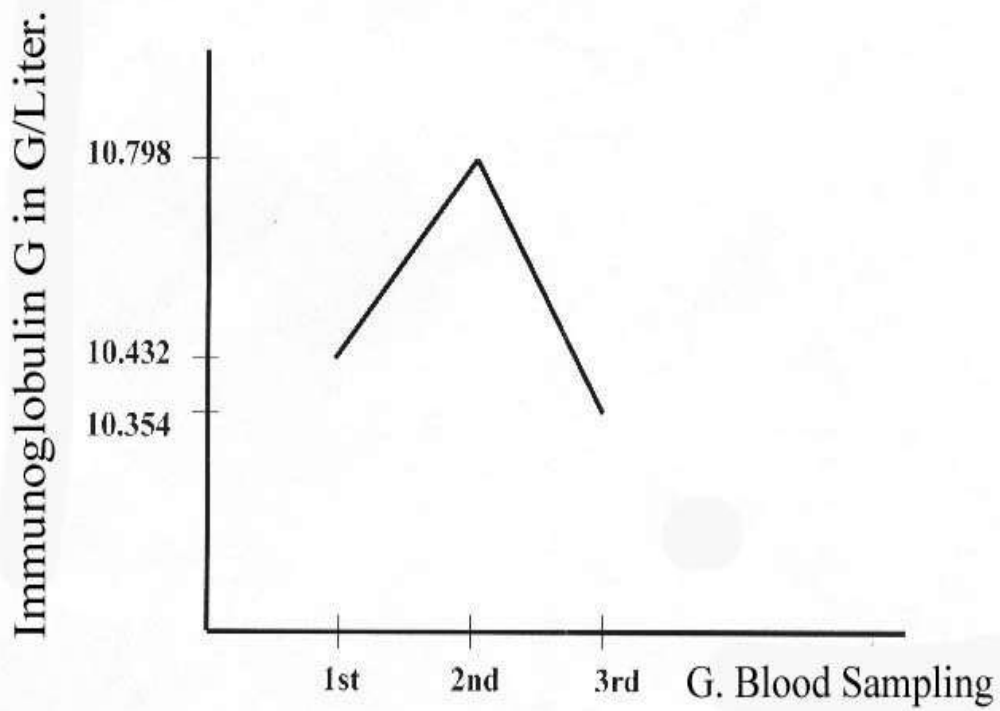


Fig .2. -: Evolution of immunoglobulin G.

DISCUSSION AND CONCLUSION :

According to the recent literature⁽¹²⁾ , it has been shown that at least part of the damages occurring in the periodontium is due to the immune response to the antigens of the dental plaque⁽¹³⁾ . it might be presumed that plasma cells of the gingival producing immunoglobulin were directed against the bacteria of the gingival crevice⁽¹⁴⁾ .It has been difficult to demonstrate a direct relationship between the immunoglobulin of the gingival and the antigens of dental plaque bacteria , such a situation is not uncommon at sites of chronic inflammation in response to bacterial infection⁽¹⁵⁾ . The studies applied on the immunoglobulin of peripheral blood in relation to local gingival bacterial Ag , could not demonstrate the real influences of these Ag on the evolution of immunoglobulin ,may be due to the heavy influences of the chronic or symptom less systemic diseases and may be due to the huge microorganism discrete aggression on human body which may kept in balance with the immune defenses⁽¹⁶⁾ . We suggest this sampling technique to open the way in front of the immunologic studies taking the gingival blood as a source of information about the oral inflammatory immune reactions. The gingival blood may represents the nearest area to the site of infection and could represents the site of active reactions⁽¹⁷⁾ . The gingival sulcus epithelium represents the weakest area and the most susceptible , delicate, and sensible barrier which separates between bacterial antigen and the gingival blood⁽¹⁸⁾ . this thinnest barrier which is the place of our sampling represented the weakest first line of defense against bacterial challenges , the Ag-Ab reaction has been detected positively in the gingival crevice as well as in the gingival tissues^(19,20) . Again , the Antigen - Antibody - complement reaction has been proved found on the basal membrane of the cervical epithelium⁽²¹⁾ . on other hand , a local production of immunoglobulin and complements had been observed in the gingival tissues and crevice during the evolution of gingival inflammation^(22,23) . The regression and the reversibility of gingival inflammation after the restore of oral hygiene proofs again that the decrease of IgG amount in the 3rd sampling is clearly related to the decrease in the amount of bacterial plaque and its antigens. This position could suggests a positive correlation between the presence of bacterial antigens and the amount of immunoglobulin G in the gingival , taking in consideration that the ultrasonic scaling may leads to a temporary elevation in immunoglobulin amount, which may related to the process of regeneration occurring after scaling⁽²⁴⁾ . The non significance of the evolution in amount of IgG could be explained by the limitation in area of sampling which were the papillae of upper anterior segment , and may due to the influence of regeneration process after ultrasonic scaling . In addition to the fact that the gingivitis is started with the augmentation in the amount of lymphocyte T more than that of B , both exhibits a blast transformation in this state , only those of B type which already transformed into plasma cell will able to produce antibodies , Another factor could influence the results is that the activation of immune system in the gingival tissue are antigenic and mitogenic which means that the production of specific and non specific of all types of antibodies⁽²⁵⁾ .The amount and type of immunoglobulin found in the gingival blood were identical to that found in the gingival tissues^(26,27) these studies suggested that the amount of IgG increase successfully as the inflammation progress from gingivitis to periodontitis⁽²⁸⁾ . In conclusion .we suggest that the gingival blood could give a close , clear picture of immunoglobulin evolution during the gingival inflammation and, on other hand the immunoglobulin G is an essential factor playing a big role in immune response in the gingiva as it evolve positively with the disease progression and/or regression.

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