# Radiographic evaluation of the S2-complex drug on the alveolar bone height

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## Abstract:

The S2-complex drug is a chemical preparation of a low molecular weight, synthetic organometalic complex, and it has experimented in many researches to prove it's activity in the treatment of the cancerous tumors, without any side effects. This drug is a potent immunomodulat or that stimulates both, the humoral and cell mediated immune responses.

To examine the effect of S2-complex administered locally and was designed to test the potential effectiveness of S2-complex in the management of periodontal disease associated bone loss by radiographic evaluation.

Thirty six pairs of similarly involved periodontal pockets in (20) patients aged between (30-50) years old with pocket depth more than 6 mm were selected. Split mouth randomized study was carried out. Scaling and root planing was carried out in both sides, in test side received S2- complex for five days in a daily dose of 0.1 mm/kg injected deeply until reaching the bone of affected site, while the control side was received distal water for 5 days in a daily dose of 0.1 mm/kg injected in the same way as that for test side. S2 complex was infiltrated locally through the gingival tissue of the effected site deeply until reach the defect bone using disposable insulin syringes.

Clinical attachment level of gingiva were recorded at baseline and repeated once every 2 weeks. Periapical radiographs were taken for both test and control sides at baseline and at the termination of the treatment after 2 months. A long the time of study the patients put on a program of motivation to keep a good stander of oral hygiene. Clinical and radiographical parameters in general showed improvement with both test and control groups, with a statical significant difference between them.

Radiographical evaluation showed high differences in hight and density of bone for both groups, and effect to S2-complex was on sites of anterior and molar areas according to the hight and density of bone .

There was high improvement in the clinical attachment level from the base line in control & test sides , there was higher difference between them.

## Key words :

S2-complex , Parallel technique , alveoler bone height .

## Introduction:

At the present time activation and enhancement of the host resistance by factors known as biological response modulators is the most convenient mode of immunotherapy. These factors act by a diversity of ways to affect the immune response, either affecting specific component of immune system or by

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general stimulation of most element. Up to date, several agent act as immune modulators some of which are extracted biologically like bacillus calmette Guerin (BCG). Keyhole limpet haemocyanine (KLH) or low molecular weight products of certain microorganisms and plants like Bestatin, Lentinan or synthetic chemicals as levamizol, cemitidene,in addition to the use of lymphokines such as interferons [1,2]. S2-complex an immunomodulator with antitumour effect, this complex is a synthetic low molecular weight organometalic compound , developed by AL-Nihrian University. Collage of Iraqi medicine and patented under the No. 2836/15-1-1992 with Iraqi classification [3] and international classification (61k).

S2-complex enhanced both humoral and cell mediated immune responses when administered systemically in patients with squamous cell carcinoma of the head and neck [4].

The ultimate goal of periodontal therapy is the regeneration of periodontal tissue destroyed in architecture and function this includes denovo formation of connective tissue attachment and the regrowth of alveolar bone [5,6,7]

The local effects of S2 complex on periodontal tissues was studied by Mummikor et al[8]. Who observed acanthosis and hyperkeratinization of the sulcular non-keratinzed squamous epithelium, when intravestibular injections were given in the lower anterior region in rabbits. Since S2 complex is an immuno-modulating agent so it would therefore be of interest to conduct this study to find out the clinical, and radiological effect mediated by local administration of S2 complex on patients with chronic periodontitis. This can prove to be helpful in understanding the effect on bone and soft tissue regeneration.

Alveolar bone which revealed hyper cellular activity, with increased bone matrix and densely filled bone marrow spaces, in addition to that, evidence of new bone formation at the bone surface adjacent to the PDL space were observed [9].

## Materials and Method:

### Sample selection

20 patients (8) females and (12) males , with average age range of (30-50) years ,all patients were in good health and no sign or symptoms any systemic diseases and fitted the following criteria:

- No history of subgingival instrumentation in the previous 6 months.

- No antibiotics taken in last 3 months.

• Chronic periodontitis involving both sides of both jaws to asimilar extent.

• Both sides of periodontal pockets more than 6 mm in contra lateral quadrants.

• The presence of inflammation and subgingival calculus in the quadrants to be cleaned.

• Agreed to participate in the study
- Radiographic evidence of bone loss.

### S2-complex

This new organic complex drug with low molecular weight (M.W) was obtained from the laboratpries ofAl-Nihrrian University, College of Iraqi medicine. S2-complex was given to patients using the standard solution that contains S2-complex in a concentration of 7.22 mg/ml. Each weighted dose of S2 complex was converted into a same dose in (ml) according to the following equation:

0.5 mg X b.w

------------------- = Daily dose in (ml) through continues five days.(b.w is body weight) 7.22.

## Instruments and materials
### A- Materials used in dental clinic:
- curettes (Gracey number 1-2, 5-6, 7-8)
- Hot air sterilizer
- William's peridontal probe.
  - EMS sealer (piezon master 400).
  - Disposable insulin syringes (0.33 X 13 mm).
- Kidney dish.
- Examination kit (dental mirrer, tweezers, and probe).
- S2-complex solution
- Distilled water.
- Cotton and cotton rolls.
  - Local anesthesia (septodent, Lido caine hydrochloride 2% 2.2 ml, 
    1:80.000 (Epinephrine)
  - Dental syringe

## B- Materials and methods in radiology department
1-Dental x-ray machine. General electric Co. Milwaukee. Wisconsin USA serial No. 107078 LS.
2- Dental x-ray film : periapical: type kodak film D.
3-Plastic film holder.
4- Aluminium steep wedge.
5- Dental radiographic viewer with magnifying lens (star x-ray) X10
  6- Dental x-ray film prossor (manual processing).
  7- Virinia.
  8- Long cone.
  9- Mercurial thermometer

## Radiographical procedure
### a- Production of the radiographs
A full mouth periapical x-ray had been taken for each patient of the fourteen films, whom chosen for this study for the evaluation evidence of bone lose. Exposure were made by the same operator in order to eliminate the possibility of the existence of any variation in technique between different operators. Exposure were made using an x-ray machine type general electric 1000.

Exposure factors were fixed on the following : sixty five kvp (killovoltage) , ten mA, 1.5 seconds exposure time for molars , one second for premolars, and 0-5 seconds for anterior teeth . 16 inchs tube film distance 2.7 millimeters aluminium half value layer , and 2.5 millimeters aluminium filtration.

These radiographs had been taken at baseline ($V_o$) prior to treatment , and were repeated at week 2 ($V_1$) week 4 ($V_2$), week 6 ($V_3$) and week 8 (V4).

### b- Processing
Manual processor was used with processing solutions that were:
  1- Developer solution type Xo-90C.
  2- fixer solution type f-C.
After exposing the films, they were processed. The developing, fixing and washing times were as following.
First: Developing time (7 min.)
Second; fixing time (14 min)
Third: washing time (thirty minutes)

The manufactures instruction were strictly followed regarding the preparation of the chemicals and washing time. The developer tank has 1-5 liter capacity while the fixer tank has one liter capacity.

The processing solution, temperature of both the developer and fixer solutions were continuously checked during the developing and fixing procedures using a mercurial thermometer.

After processing, the radiographs were taken out and washed for thirty minutes under running water to remove

the remnants of fixer solution that may affect the quality of radiograph in the future.

**c- Mounting :**

After complete dryness of the processed film, were mounted for each patient in a white opaque mount for easy diagnostic purpose. 4-Examination of radiographs.

The radiographs had been taken at the baseline (VO) for each patient were examined and compared to the V1,V2,V3, and V4 it was found that the radiographic change obviously seen mostly at (V4), so the comparison was made between VO and V4 using the viewer with magnifying lens X10 we examined the radiographic change in the alveolar bone height which measured by using veneir for the anterior area , premolar area and the molar area while the radiographic change related to opacity changes was measured by using the aluminum step wedge that have ten steep of aluminium each step of 1mm the step (6) have the same opacity of normal alveolar bone. To which the changing in opacity was noticed in between VO (first visit) and V4 (last visit)and recorded the results were

subjected to statistical analysis,between one visit and other is two weeks in total of eight weeks between the VO and V4, using cemento enamel junction (CEJ) as a reference point for the measurement of the alveolar bone hight. The motivation period for six weeks for each involved patient .Instructions were given for breshing and mouth wash,some patients need for scaling and polishing.

**d- Evaluation of Radiographs :**

Three qualified dental radiologist evaluate the radiographs according to their experience and knowlage . Their readings were subjected to statical analysis.

# Result

## 1. Radiographical Findings

Table (1) showed comparison between (V0-V4) in control and test group according to the height of bone, therefore there was no significant differences for control group in all regions (anterior, premolar, and molar region) compared with high significant differences in the test group for the all regions.

**Table (1):** The difference in the mean height of bone between visit 0 and visit 4 for control and test site

| Group | Region | Visit | Mean | SD | t-test | df | P-valu | Sig |
|---|---|---|---|---|---|---|---|---|
| Control | Anterio | V0-V4 | -- | -- | -- | -- | -- | NS |
| Test | = | V 0- V 4 | 1.250 | 0.4183 | 7.319 | 5 | 0.0001 | HS |
| Control | Premol | V 0- V 4 | 0.333 | 0.4082 | 2.000 | 5 | 0.102 | NS |
| Test | = | V 0- V 4 | 1.0833 | 0.2041 | 13.00 | 5 | 0.000 | HS |
| Control | Molar | V 0- V 4 | -- | -- | -- | -- | -- | NS |
| Test | Molar | V 0- V 4 | 1.000 | 0.4472 | 5.477 | 5 | 0.003 | S |

- P <0.05 Significant
- P >0.05 Non significant
- P <0.0001 High significant

Table(2)shows the anterior region almost the same chang in malor region ,(2.928) in the anterior and (2.988) in the molar region at test groub in compering the density of bone to alaminum step wedge ,but more chang was noticed at premolar region (5.324) in t.test value .

In region of premolar seqment for test group showed the most beneficial effect of treatment comparing with other region in the same P- value was (P< 0.0001) for premolar region, while (P<0.001) for anterior region and (<P0.003) for molar region. (table3and 4).

**Table (2) :** represent differences between control & test sites at (0-4) visits according to density of bone to Aluminium step wedge ( 10 steps )

| Group | Region | Visit | Mean | SD | t-test | df | P-valu | Sig |
|---|---|---|---|---|---|---|---|---|
| Control | Anterio | V0- V 4 | -- | -- | -- | -- | -- | NS |
| Test | = | V 0- V 4 | 1.000 | 0.836 | 2.928 | 5 | 0.033 | S |
| Control | Premol | V 0- V 4 | -- | -- | -- | -- | -- | NS |
| Test | = | V 0- V 4 | 1.000 | 0.6055 | 5.394 | 5 | 0.003 | S |
| Control | Molar | V 0- V 4 | 0.000 | 0.00 | 0.000 | 5 | 1.000 | NS |
| Test | Molar | V 0- V 4 | 0.833 | 0.683 | 2.988 | 5 | 0.031 | S |

P < 0.05 Significant
P > 0.05 Non significant

**Table (3):** represent differences between control & test sites at (4) visits according to hight of bone

| Regio | group | Mean | Mean | SD | SD | t-test | df | P-value | Sig |
|---|---|---|---|---|---|---|---|---|---|
| Anter | Control | 1.4167 | 1.4167 | 0.801 | 0.491 | 7.059 | 5 | 0.001 | HS |
| = | Test | 2.8333 | | 0.816 | | | | | |
| Premo | Control | 0.6667 | 0.9167 | 0.258 | 0.241 | 11.00 | 5 | 0.000 | HS |
| = | Test | 1.6667 | | 0.258 | | | | | |
| Molar | Control | 0.5833 | 1.0833 | 0.204 | 0.584 | 4.540 | 5 | 0.006 | S |
| = | Test | 1.6667 | | 0.516 | | | | | |

P <0.05 Significant
P <0.0001 High significant

**Table (4):** represent differences between control & test sites at (4) visits according to density of bone related to Aluminium steep wedge ( 10 steps )

| Regio | group | Mean | Mean | SD | SD | t-test | df | P-value | Sig |
|---|---|---|---|---|---|---|---|---|---|
| Anter | Control | 7.916 | 1.416 | 0.801 | 0.584 | 5.937 | 5 | 0.002 | HS |
| = | Test | 6.500 | | 0.707 | | | | | |
| Premo | Control | 7.250 | 1.416 | 0.273 | 0.664 | 5.222 | 5 | 0.003 | HS |
| = | Test | 5.833 | | 0.408 | | | | | |
| Molar | Control | 7.083 | 0.583 | 0.204 | 0.584 | 2.445 | 5 | 0.058 | S |
| = | Test | 6.500 | | 0.547 | | | | | |

P < 0.05 Significant
P < 0.0001 High significant

## 2. *Clinical Attachment Level (CAL)*

When comparing control and test groups in the first visit (visit 0) I obviously the mean clinical attachment level scores showed no significant differences, mean clinical attachment level index was (5.0278) for control group and (5.000) for test group with the significant difference between them.

But there are highly significant differences in the mean clinical attachment level scores, when comparing the two groups at the same visit starting from visit 1 to visit 4 that mean there was highly improvement in the clinical attachment level from the baseline , mean score (4.5556) for visit 1 of control group while mean score (4.3333) for visit 4 of the same group, mean score (4.000) for visit 1 of test group while (2.71917) mean for visit 4 of the same group, p-value was (P< 0.0001).

For controlling group there was a slight reduction from visit 1 (4.55) to visit 4 (4.33) , while there were high significant reduction for test group from visit 1 (4.00) to visit 4 (2.71). The mean clinical attachment level scores in the visit 4 was (2.7917) for the test group, while in the baseline (visit 0) it was (5.0000). The mean clinical attachment level scores for the same previously visits for control group is visit 0 (5.0278), visit 4 (4.3333) (Table 5).

**Table (5):** Differences between control & test sites in the same visit ( CAL )

| Group | Visit | Mean | SD | t-test | df | P-value | Sig |
|-------|-------|------|-----|--------|-----|---------|-----|
| Test | | 5.000 | 0.5606 | 1.435 | | | NS |
| Contr | 0 | 5.0278 | 0.5725 | | 35 | 0.160 | |
| Test | | 4.000 | 0.5606 | 20.917 | | | HS |
| Contr | 1 | 4.5556 | o.5315 | | 35 | 0.000 | |
| Test | | 3.6389 | 0.6166 | 16.803 | | | HS |
| Contr | 2 | 4.5556 | 0.5315 | | 35 | 0.000 | |
| Test | | 3.1111 | 0.6667 | 25.183 | | | HS |
| Contr | 3 | 4.5139 | 0.5792 | | 35 | 0.000 | |
| Test | | 2.7917 | 0.5779 | 25.276 | | | HS |
| Contr | 4 | 4.3333 | 0.5732 | | 35 | 0.000 | |

P > 0.05 Non significant
P < 0.0001 High significant

3- Using the correct milliamperage and the killovoltage for each site with standerized callometer, filter and exposure time, to have better contrast and density of the radiographs to insure the better image of the tooth and alveolar bone especially from its depth and size.

The low of the above factors will lead to bum out the enamel peripheral surface. This phenomena is called peripheral bum out that will affect the cemnto enamel junction in our study considered the cemento enamel junction as a reference point for measurement of the alveolar bone crest. Using virinia one of its end on the cemento-enamel junction and the other end on the level of the alveolar bone crest with use of vrnia and magnifying lens that aid us in good measurement.

The conventional radiograph are an accessary prereqaisite in order to arrive at the best possible diagnosis as shown in present study the remodeling with slight bone formation in crest of alveolar bone in deffect

sites of chronic periodontits that received S2-complex injection locally when compared with the control group evident when measured height of alveolar bone radiographically by used the cemento-emamel unction as areferene point.

This could be attributed by the hyperactivily ofosteoblasts induced by the stimulatory effect of S2-complex , these result agree with the previous study conducted by Jeffcoat et al.

## Discussion & Conclusion:

The present study has shown slight radiographic change have been noticed in bone formation in crest of alveolar bone in effected side of chronic

periodontitis, after receiving S2-complex injection.

The discussion of the subject will be clearited under the following main headings:

a- The role of examiners on evaluation of radiographs in bone formation in alveolar crest in the effected site of chronic periodontitis after injection S2-complex.

b-The effect of radiographic quaility factors on the level of alveolar bone evaluation.

c-Other factors affecting radiographic evaluation of the alveolar bone height formation.

*a- The Role of Examiner*

The observers agreed in the assessment of the radiographs for the presence of bone formation of the alveolar crest and were confirmed statistically that confirm the finding of [7] who studied the role of examiner in radiograohic examination of alveolar bone crest [10, 11] who studied the effect of instructions given to the experienced observers under controlled conditions.

*b- The effect of radiographic quality factors on the level of alveolar bone crest evaluation.*

Results obtained in table [3,4] shown that these tables show when the radiographs examined for localization the level of alveolar bone crest that notice it increase more in premolar site than that of anterior and posterior sites in most of the patient the cause of this finding in our though could be these sites have less masticatory force than the other sites [12, 13]

*c- Other factors affecting radiographic evaluation of the alveolar bone height formation.*

1- cone positioning : correct horizontal and vertical angulations to insure the

importance of making radiographs tends to affect the diagnostic ability

2- Film positioning: inside patient mouth using paralling technique with film holders so that the image to have the same geometry of the tooth and surrounding structure.

Radiographical evaluation showed high significant differences in the height and density of bone in between two sits in the premolar area , and

showed more improvement than that in other sites of anterior and molars areas.

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