

# Oral – Versus Systemic Immunity of Patient with *Staphylococcus .aureus* Dentoalveolar Infections

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## Abstract

*Staphylococcus aureus* was diagnosed as associated causal of human dento-alveolar infections. It stimulates the increase in mucosal and systemic neutrophil phagocytosis in comparised to normal control subjects *S. aureus* cell free culture filtrate sensitize the primed muasal and the peripheral lymphiod cells to produce significant leucocyte inhibitory cytokines *S.aureus* specific antibody titer rise at mucosal surface and sera of patients were noted. The nature of such specific antibodies was not of IgM type.It might be of IgG type in sera of patients.

## الخلاصة

جرى تشخيص المكورات العنقودية الذهبية من مرضى Dentoalveolar infeactions هذا الممرض كان قد حدث في المرضى لزيادة ملحوظة في العدلات البلعمية مقارنة بالاسوياء في السطوح المخاطية و في الدم المحيطي وادت خلاصة النمو الحرة من الخلايا الى انتاج عامل تثبيط هجرة الخلايا البيض وبصفه معنوية وتبين بان الممرض قد ادى لحت زيادة في انتاج الاضداد المتخصصة ب و في السطح المخاطي وكانت طبيعة هذه الاضداد ليست من صنف المحيطي في الدم *S.aureus* IgM وربما تكون من صنف IgG

## Introduction

Although the tremendous literature on *S.aureus* clinical infection in man relatively little attention has been paid to the oral cavity as reservoir for this organism and may cause angular cheilitis. Some endodontic infections and osteomyelitis of the jaw and oral mucositis are known to cause by *S.aureus* as oral bacterial pathogen(Smith et al 2001,Smith et al 2003).However recently , researchers have been reported on the role of *S.aureus* in dental and periodontal disease (Luberto et al 2004) Following with this recent trend the present work was aimed at studying the status of patients with *S. aureus* dentoaveolr infections

## Materials and Methods

### 1. Patients:

Three groups of disease entities included in the dentoalveolar infection were clinically diagnosed as peridontitis 7gingivitis 5 and chronic pulpitis 3 (smrranayke et al 2002). Ten apparently normal human subjects were included as a control.

### 2. sample processing:

The dentoaloveolar material of 15 patients was swabbed by sterile cotton swabs into which three mls of sterile normal saline was added. Through mixing was dons for these samples

### 3. Bacteriology :

Loopful inocula were taken from the swab saline mixtures and quadrate streaked onto blood agar and nutrient agar plates, then incubated at 37C for an overnight period under aerobic conditions. Biochemical isolates as Maffidin 2000.

### 4. Immunoglobulin separation:

the through mixed swab saline becomes slightly opaque due to protein & cellular contents (Item three) the suspension was centrifuged at 3000 R.P.M for five minutes. Supernats were aspirate into sterile clean centrifuged tube which 3 ml of PEG6000 6% solution was added in refrigerator at 4C for 1hr (Item two) precipitation was scattered at bottom centrifuged at 5000 R.P.M for 15 min. discard supernate and

keep precipitation redissolution into 0.5% formal saline (Johnaston and Thorap 1982)

**5. mucosal leucocytes separation :**

the deposite of primery swab-saline suspension (item three) was washed once with saline and resuspended in 3 ml saline. To this washed cell suspension three ml of 3% dextrane was added the mixture left at 250 c° (room temp) for 20 min. dextrian-leucocyte apper layer was aspirated tubbed into plane tube ,centrifuged at 3000 R.P.M for 15 min. The supernate was discarded, pellet saved and resuspended into saline and washed twice , the resuspended into original volume in sterile saline

6. **blood** : blood with and without anticoagulant in three ml . amounts were collected from 15 patients and 10 normal subjects .

**7. standard tube agglutination test (STAT):**

The STAT was done as in Garvey et al 1977.

**8. N.B.T test :**

N.B.T on mucosal and peripheral blood leucocytes was done as in Park et al 1968

**9. LIF test:**

LIF on mucosal and systemic was perfomed by capillary method as in Soberg, 1968

**Result**

**1- The infectious Agents**

The primary plate culture of the patients dentoalveolar materials anto blood agar showed colonies of staphylococcal like morphotypes with golden endo pigmentation. The pure isolates were gram positive cocci in clusters, catalase and coagulase positive. Salt tolerant and phenol agar. These criteria are consistent with *S.aureus*

**2- Dentoalvelar Infections:**

The s.aureus was found associated with seven cases of peridontitits five cases of gingivitis and three cases of chronic pulpitis

**3- Neutrophil phagocytosis :**

The phagocytic activity as tested by N.B.T were of higher percentages both for mucosal and in peripheral neutrophils in comparison to normal control subjects (Table 1-3)

**4- Leuconte inhibitory factors:**

Significant leucocytes inhibition noted both for mucosal and peripheral leucocytes indicating that the sensitizar stimulate primed leucocyte for production of LIF cytokine by patient in comparison to non significant LIF in control subjects (Tables 1-3)

**5- Mucosal antibody :**

The range of mean values of mucosal antibody titers specific to *S.aureus* 14.6 – 42.7 as compared to 2 in normal control subjects mucosal antibodies were 2ME resistant (table 1-3)

**6- Serum antibodies :**

The range of mean values of serum antibody titers specific for *S.aureus* in patients were 146-427 as compared to 10 in normal control subjects. Serum antibodies were 2ME resistant (Tables 1-3)

**Table 1: Immune status of *S.aureus* associated peridontitis (7cases)**

	Mean	Medan	Range	N.S means
MIGC	0.75 gm/L	0.28	0.6- 0.82	0.299
STPC	71.3 gm/L	73.5	68 – 73.5	66.43
SGC	39.4 gm/L	38.7	36- 48.2	36.22
MIGT				
2ME –	14.6	16	8- 32	2
2ME +	14.6	16	8- 32	2
SIGT				
2ME –	146	320	80- 320	10
2ME +	146	320	80- 320	10
LIF				
M	54.4	56	48 – 58	0.94
S	62.3	62	52- 68	0.95
NBT				
M	39.6 %	42	33- 448 %	9.8
S	34.3%	34	32- 39 %	10.8

\* N.S= Normal subject

MIGC=Mucosal Immunoglobulin concentration

STPC =Serum total protein concentration

SGC=Serum globulin concentration

MIGT= Mucosal Immunoglobulin titer

SIGT =Serum Immunoglobulin titer

LIF = Lecocytes Inhibitory Factor.

M = Mucosal

S= Systemic

N.B.T=Nitroblue tetrazolium reduction Test .

**Table 2: Immune status of *S.aureus* associated gingivitis (five cases)**

	Mean	Medan	Range	N.S means
MIGC	0.75	0.73	0.64- 0.85	0.299
STPC	67.2	69.5	39.3– 80.3	66.43
SGC	42.1	36.2	36- 48.2	36.22
MIGT				
2ME –	30.4	16	8- 32	2
2ME +	30.4	16	8- 32	2
SIGT				
2ME –	304	160	80- 320	10
2ME +	304	160	80- 320	10
LIF				
M	49.4	53	42 – 51	0.96
S	55.6	62	36 - 67	0.95
NBT				
M	42 %	45	35- 45	9.8
S	37.2%	37	34- 44	10.8

\* N.S= Normal subject

MIGC=Mucosal Immunoglobulin concentration

STPC =Serum total protein concentration

SGC=Serum globulin concentration

MIGT= Mucosal Immunoglobulin titer

SIGT =Serum Immunoglobulin titer

LIF = Lecocytes Inhibitory Factor.

M = Mucosal

S= Systemic

N.B.T=Nitroblue tetrazolium reduction Test .

**Table 3: Immune stats of *S.aureus* associated chronic pulpitis (three cases)**

	Mean	Medan	Range	N.S means
MIGC	0.99	0.78	0.78- 1.4	0.299
STPC	75.3	78.1	70.2 – 82.4	66.43
SGC	43.7	40.2	40.2- 46.3	36.22
MIGT				
2ME –	42.7	32	8- 32	2
2ME +	42.7	32	32- 64	2
SIGT				
2ME –	427	320	320 - 640	10
2ME +	427	320	320 – 640	10
LIF				
M	57.3	55	55 – 57	0.96
S	64.3	63	63 - 66	0.95
NBT				
M	45 %	41	41 - 48	9.8
S	37.7 %	36	36 - 39	10.8

\* N.S= Normal subject

MIGC=Mucosal Immunoglobulin concentration

STPC =Serum total protein concentration

SGC=Serum globulin concentration

MIGT= Mucosal Immunoglobulin titer

SIGT =Serum Immunoglobulin titer

LIF = Lecocytes Inhibitory Factor.

M = Mucosal

S= Systemic

N.B.T=Nitroblue tetrazolium reduction Test .

## Discussion

*Staphylococcus aureus* is diagnosed (table 1-3) in association with dento-alveolar infections (Smith et al 2001; Samaranyake et al 2002; Loberto et al 2004). The *S. aureus* antibodies specific rise in patients sera and dentoaveolar protein can be induced by B cell dependent and / or Th2 dependent epitope(s) (Zubler, 1998; Delves et al 2006). The LIF significant result can be induced by Th1 or T dth dependent epitopes (Male et al, 2006). There might be an epitope in the antigenic make up of *S. aureus* that activate nutrophile phagocytosis N.B.T in patients Toll- like receptors and

specific pattern recognition structures perhaps involved in such increase (Delves et al 2006; Male et al 2006)

The 2ME resistant mucosal antibody means that such antibody is of secretory type (Tomasi,1976 ) while 2ME resistant serum antibodies can be of non IgM type possibly of IgG type(Male et al 2006).

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