

**A Clinical and Biochemical Assessment of
Oncostatin M Level in Gingival Crevicular Fluid in
Patients with Periodontal Disease before and after
Periodontal Treatment**

Thesis

Submitted in Partial Fulfillment of the Requirements of Master
Degree in **Oral Medicine, Periodontology and Oral Diagnosis**

Presented By

Hadeel Gamal Salem Al-Malahy

B.D.S (Faculty of Dentistry, Ain Shams University, 2006)

Supervisors

Dr. Khaled Atef Abd Elgaffar

Professor and Chairman of Oral Medicine, Periodontology, Oral
Diagnosis and Radiology Department
Faculty of Dentistry, Ain Shams University

Dr. Hala Ahmed Abu El Ela

Professor of Oral Medicine, Periodontology,
Oral Diagnosis and Radiology
Faculty of dentistry, Ain Shams University

Dr. Olfat Gameel Shaker

Professor of Medical Biochemistry
Faculty of Medicine, Cairo University

**Faculty of Dentistry
Ain Shams University
2013**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَعَلَّمَكَ مَا لَمْ تَكُن تَعْلَمُ وَكَانَ
فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا

صدق الله العظيم

سورة النساء آية (113)

Acknowledgment

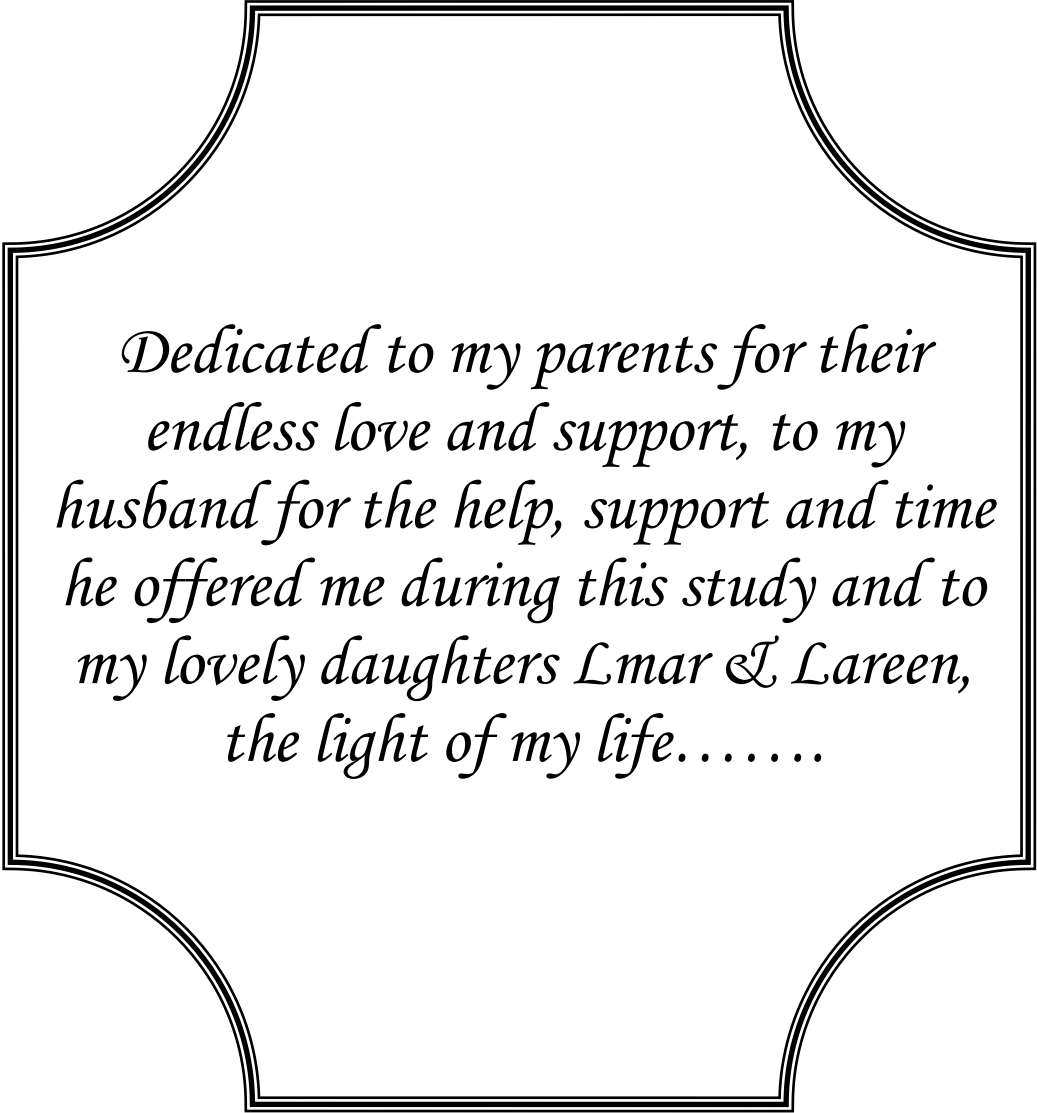
First and foremost, I feel indebted to God, the most merciful, who gave me the power to accomplish this work.

I would like to express my gratitude to Dr. Khaled Abd El Gaffar, Professor and Head of Oral Medicine and Periodontology department, for being an outstanding advisor and excellent professor. His constant encouragement, support, and invaluable suggestions made this work successful.

I am deeply indebted to Dr. Hala Abu El Ela, Professor of Oral Medicine and Periodontology, for her kind concern, patience and steadfast encouragement to complete this study.

I am also thankful for Dr. Olfat Gameel Shaker Professor of Medical Biochemistry Faculty of medicine, Cairo University for her help and for being generous with time and effort.

Many thanks and appreciation to staff members of the Oral medicine and Periodontology department for their support and help throughout this work. Many hours of work and data collecting can't be completed without their help.



*Dedicated to my parents for their
endless love and support, to my
husband for the help, support and time
he offered me during this study and to
my lovely daughters Lmar & Lareen,
the light of my life.....*

Table of contents

Acknowledgment	-
List Abbreviations	i
List of Tables	iv
List of Figures	vi
Introduction	1
Review of literature	4
Aim of the Study	43
Subjects and Methods	44
Results	55
Case Presentation	71
Discussion	80
Conclusions	87
Recommendations	88
Summary	89
References	91
Arabic Summary	--

List of Abbreviations

Abbreviation	Full term
AAP	American Academy of Periodontology
AgP	Aggressive periodontitis
AIDS-KS	Acquired Immune Deficiency Syndrome- Kaposi's sarcoma
ANOVA	Analysis of variance
BANA	Benzoyl-DL-arginine-naphthylamide
βG	β- glucuronidase
BOP	Bleeding on probing
BSA	Bovine Serum Albumin
CAL	Clinical attachment level
CD	Cluster of differentiation
CNTF	Ciliary neurotrophic factor
CSF	Colony Stimulating Factor
CT-1	Cardiotrophin-1
CXC	Chemokine (C-X-C motif)
CXCL10	Chemokine (C-X-C motif) ligand 10
CXCR	Chemokine (C-X-C motif) receptor
Da	Dalton
DNA	Deoxyribonucleic acid
DPP	Dipeptidyl peptidase
EGF	Epidermal Growth Factor
ELISA	Enzyme-linked immunosorbent assay
GAP	Generalized aggressive periodontitis
GCF	Gingival crevicular fluid
GM-CSF	Granulocyte Macrophage Colony Stimulating Factor
GP 130	Glycoprotein 130
HGF	Human gingival fibroblasts
HIV	Human immunodeficiency virus
HMEC-1	Human microvascular endothelial cells
HRP	Horseradish Peroxidase
ICAM	Intercellular adhesion molecule

List of Abbreviations (Cont.)

Abbreviation	Full term
IL	Interleukin
Ig G, M, A	Immunoglobulin G,M,A
IFN- β	Interferon beta
IFN- γ	Interferon gamma
IR	Infrared
JAK	Janus kinase
LAP	Localized aggressive periodontitis
LIF	Leukemia-inhibitory factor
LIF R	Leukemia-inhibitory factor-Receptor
LLD	Lower Limit of Detection
LPS	Lipopolysaccharide
MAP	Mitogen activated protein
MMP	Matrix metalloproteinases
OA	Osteoarthritis
OCT	Optical coherence tomography
OPG	Osteoprotegerin
OSM	Oncostatin M
OSMR	Oncostatin M receptor
PBS	Phosphate-buffered saline
PD	Periodontal disease
PDGF	Platelet-derived growth factor
PGE2	Prostaglandin E2
PI	Plaque index
PI3K	Phosphoinositide 3 kinase
PL	Parameter logistic
PMN	Polymorphonuclear Leukocyte
PPD	Probing pocket depth
PSGL-1	P-selectin glycoprotein ligand 1
PTH	Parathyroid hormone
RA	Rheumatoid arthritis
RANKL	Receptor activator of nuclear factor- κ B ligand
RAS	Rat sarcoma

List of Abbreviations (Cont.)

Abbreviation	Full term
SAA	Serum amyloid A
SRP	Scaling and root planing
STAT	Signal Transducer and Activator of Transcription
t-PA	Tissue type plasminogen activator
TGF- β	Transforming Growth Factor-Beta
TH-1	T Helper Cell Type 1
TIMP	Tissue inhibitor metalloproteinases
TMB	Teramethyl-benzidine
TNF- α	Tumor Necrosis Factor alpha
VCAM	Vascular Cell Adhesion Molecule
VEGF	Vascular Endothelial Growth Factor

List of Tables

Table (1): Translation of periotron values to clinical conditions and gingival Index with which they may be associated	39
Table (2): Descriptive statistics and test of significance for the effect of group and treatment on plaque index.....	57
Table (3): Descriptive statistics and test of significance for the effect of group and treatment on sulcus bleeding index.....	58
Table (4): Descriptive statistics and test of significance for the effect of group and treatment on probing pocket depth.	58
Table (5): Descriptive statistics and test of significance for the effect of group and treatment on clinical attachment level (mm)	59
Table (6): Effect of group on changes in different periodontal parameters	59
Table (7): Descriptive statistics and test of significance for the effect of group and treatment on GCF oncostatin level.	62
Table (8): Comparison of changes in Periodontal measurements at baseline and after three months.....	65
Table (9): Effect of group on different periodontal measurements before treatment	66

List of Tables (Cont.)

Table (10): Effect of group on different periodontal measurements after treatment	67
Table (11): Pearson Simple correlation coefficient between GCF oncostatin concentration with different periodontal measurements before treatment.	69
Table (12): Pearson Simple correlation coefficient between GCF oncostatin concentration with different periodontal measurements after treatment.	70

List of Figures

Figure (1): A 1997 model demonstrating various factors contributing to the pathogenesis of human periodontitis	10
Figure (2): Oncostatin M receptors	16
Figure (3): A model of oncostatin M action	24
Figure (4): Biomarkers.....	30
Figure (5): Collection of crevicular fluid by means of gingival washings; 10ml of fluid is ejected from a microsyringe and re-aspirated	34
Figure (6): Collection of crevicular fluid by means of capillary tubing.	35
Figure (7): collection of crevicular fluid by means of filter paper strips.	36
Figure (8): Illustration of the positioning of papers for the filter paper strip method of collection	36
Figure (9): Periopaper before use	48
Figure (10): Periopaper after GCF collection.....	49
Figure (11): Pretreatment GCF collection in chronic periodontitis case	49
Figure (12): Pretreatment GCF collection in aggressive periodontitis case	49
Figure (13): Oncostatin M microplate before addition of the stop solution (Blue color)	53
Figure (14): Automated microplate reader.....	53

List of Figures (Cont.)

Figure (15): Mean periodontal measurements of chronic periodontitis group before and after treatment	60
Figure (16): Mean periodontal measurements of aggressive periodontitis group before and after treatment.	60
Figure (17): Mean changes in periodontal measurements of chronic periodontitis and aggressive periodontitis groups after treatment.....	61
Figure (18): Mean GCF Oncostatin level before and after treatment in chronic periodontitis and aggressive periodontitis groups	63
Figure (19): Mean changes in GCF oncostatin level of chronic periodontitis and aggressive periodontitis groups after treatment.....	63
Figure (20): Mean periodontal measurements of control, chronic periodontitis and aggressive periodontitis groups before treatment.....	66
Figure (21): Mean periodontal measurements of control, chronic periodontitis and aggressive periodontitis groups after treatment.....	67
Figure (22): Mean GCF oncostatin level of control, chronic periodontitis and aggressive periodontitis groups before and after treatment.	68
Figure (23): A preoperative full mouth photograph of a chronic periodontitis male patient 41 years old.	71
Figure (24): A panoramic radiograph of the same patient.....	71

List of Figures (Cont.)

Figure (25): A preoperative photograph of the same patient in figure (23) showing 7mm pocket depth mesial to upper left first premolar	72
Figure (26): A postoperative photograph of the same patient in figure (23) showing 4mm pocket depth mesial to upper left first premolar	72
Figure (27): A photograph showing collection of the gingival crevicular fluid sample from the same probing site.....	73
Figure (28): A panoramic radiograph of a generalized aggressive periodontitis female patient 22 years old.	74
Figure (29): A preoperative photograph of the same patient in figure (28) showing 11 mm pocket depth mesial to upper left first premolar... ..	75
Figure (30): A postoperative photograph of the same patient in figure (28) showing 8 mm pocket depth mesial to upper left first premolar.	75
Figure (31): A photograph showing the collection of gingival crevicular fluid sample from the same probing site.	76
Figure (32): A preoperative full mouth photograph of a localized aggressive periodontitis female patient 28 years old.	77
Figure (33): A panoramic radiograph of the same patient in figure (32).	77
Figure (34): A preoperative photograph of the same patient in figure (32) showing 6 mm pocket depth mesial to lower right first molar	78

List of Figures (Cont.)

- Figure (35):** A postoperative photograph of the same patient in figure (32) showing 5 mm pocket depth mesial to lower right first molar. 78
- Figure (36):** A photograph showing collection of gingival crevicular fluid sample from the same probing site. 79

Introduction

Periodontal diseases are the most common dental conditions. Gingivitis is gingival inflammation associated with plaque and calculus accumulation. Gingivitis may or may not progress to more advanced forms of the disease known as periodontitis, which is an inflammatory condition of teeth supporting tissues caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with periodontal pocket formation, gingival recession or both (**Rajiv et al., 2009**).

Periodontal disease is a complex infectious disease resulting from interplay of bacterial infection and host response to bacterial challenge, and the disease is modified by environmental, acquired risk factors and genetic susceptibility. Periodontal pathogens are accused for the initiation and sustenance of the inflammatory process in periodontal disease which is crucial for the destruction of mineralized and non-mineralized extracellular matrices in periodontal tissues (**Page, 1991**).

Microbial challenge consisting of antigens, lipopolysaccharides, and other virulent factors stimulates host responses. Host reactions to these infecting agents result in the release of inflammatory mediators (by cells like neutrophils, monocyte/ macrophages, T cells, mast cells, endothelial cells, fibroblasts) including proinflammatory cytokines (IL-1, IL-6, TNF- α) and prostaglandins (PGE2), which can promote extracellular matrix destruction (by matrix metalloproteinase; MMPs) in the periodontium and stimulate bone resorption. Although these immune and inflammatory host reactions are essential for host defense against bacterial inflammation, excessive and prolonged reaction is harmful for the functional periodontal tissue (**Birkedal- Hansen, 1993**).