

EVALUATION OF LONG PULSED-ND: YAG LASER IN THE TREATMENT OF ONYCHOMYCOSIS

Thesis

*Submitted for Partial Fulfillment of Master Degree in
Dermatology, Venereology and Andrology*

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2013

بسم الله الرحمن الرحيم

إقرأ باسم ربك الذي
خلق ﴿١﴾ خلق الإنسان
من علق ﴿٢﴾ إقرأ وربك
الأكرم ﴿٣﴾ الذي علم
بالقلم ﴿٤﴾ علم الإنسان
ما لم يعلم ﴿٥﴾

صدق الله العظيم

سورة العلق
الآيات (١-٥)



First of all, thanks to **Allah** the most merciful for giving me the strength to complete this work.

I would like to express my gratefulness and respect to **Prof. Dr. Hoda Ahmed Monieb**, Professor of Dermatology, Venereology and Andrology, Ain Shams University for her moral and sincere scientific support and for kind observation and valuable advice that were essential for this work to be achieved.

I would like to express my thanks and gratitude to **Prof. Dr. Mohammed Taha Mahmoud**, Professor of Microbiology, Faculty of Veterinary medicine-Zagazeg University for his priceless help and his kind supervision.

I would like to express my gratitude and respect to **Dr. Mary Fekry Matta**, Lecturer of Dermatology, Venereology and Andrology, Ain Shams University for her valuable time, remarkable efforts, help and guidance.

I would like to express my gratefulness and respect to **Asst Prof. Dr. Ahmed Fathy Al-bedewey**, Assistant Professor of Dermatology, Venereology and Andrology, National Center for Radiation Research and Technology for his scientific support and for kind observation and valuable advice that were essential for this work to be achieved.

I would like to express my gratitude and respect to **Dr. Moha Fawzy Ibrahim**, Lecturer of Dermatology, Venereology and Andrology, National Center for Radiation Research and Technology for her valuable time, remarkable efforts, help and guidance.

Finally I wish to express my deepest gratitude and appreciation to all my Family for their patience, moral support and encouragement.

Eman Mohamed

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List of Abbreviations

Abb.	Full term
<i>AIDS</i>	: <i>Acquired immunodeficiency diseases</i>
<i>ALA</i>	: <i>aminolevulinic acid</i>
<i>Apaf-1</i>	: <i>Apoptotic protease activating factor 1</i>
<i>ATP</i>	: <i>Adenosine-5'-triphosphate</i>
<i>BCP</i>	: <i>Bromcresolpurple</i>
<i>C. albicans</i>	: <i>Candida albicans</i>
<i>C. glabrata</i>	: <i>Candida glabrata</i>
<i>C. krusei</i>	: <i>Candida krusei</i>
<i>CO₂</i>	: <i>Carbon dioxide</i>
<i>C. parapsilosis</i>	: <i>Candida parapsilosis</i>
<i>C. tropicalis</i>	: <i>Candida tropicalis</i>
<i>CHS1</i>	: <i>Chitin synthase 1 gene</i>
<i>CMI</i>	: <i>Cell-mediated immunity</i>
<i>DLSO</i>	: <i>Distal and lateral subungual onychomycosis</i>
<i>DMSO</i>	: <i>Di-methyl sulfoxide</i>
<i>DNA</i>	: <i>Deoxyribonucleic acid</i>
<i>DTH</i>	: <i>Delayed-type hypersensitivity</i>
<i>DTM</i>	: <i>Dermatophyte test medium</i>
<i>DUBs</i>	: <i>Deubiquitinating enzymes</i>
<i>EGF</i>	: <i>Epidermal growth factor</i>
<i>EO</i>	: <i>Endonyx onychomycosis</i>
<i>Er:YAG</i>	: <i>Erbium-doped yttrium aluminium garnet</i>

HIV	: <i>Human immunodeficiency virus</i>
HPV	: <i>Human papilloma virus</i>
HRQoL	: <i>Health related quality of life</i>
HSBP1	: <i>Heat shock factor binding protein 1</i>
HSF	: <i>Heat shock factor</i>
HSP	: <i>Heat shock protein</i>
HZ	: <i>Hertz</i>
IL-1	: <i>Interleukin-1</i>
ITS1	: <i>Internal transcribed spacer 1</i>
KOH	: <i>Potassium hydroxide</i>
KONCPA	: <i>Potassium hydroxide treated nail clipping with periodic acid-schiff</i>
Laser	: <i>Light Amplification by Stimulated Emission of Radiation</i>
LPCB	: <i>Lacto-phenol cotton blue</i>
<i>M. audouinii</i>	: <i>Microsporum audouinii</i>
<i>M. canis</i>	: <i>Microsporum canis</i>
<i>M. cookie</i>	: <i>Microsporum cookie</i>
<i>M. ferrugineum</i>	: <i>Microsporum ferrugineum</i>
<i>M. gypseum</i>	: <i>Microsporum gypseum</i>
<i>M. nanum</i>	: <i>Microsporum nanum</i>
Nacl	: <i>Sodium chloride</i>
NaOH	: <i>Sodium hydroxide</i>
Nd: YAG laser	: <i>Neodymium-doped yttrium aluminium garnet</i>
NDMs	: <i>Non-dermatophyes moulds</i>
PAS stain	: <i>Periodic acid Schiff stain</i>
PCR	: <i>Polymerase chain reaction</i>

PCR-RFLP	: <i>Polymerase chain reaction-restriction fragment length polymorphism assay</i>
PDA	: <i>Potato dextrose agar</i>
PDGF	: <i>Platelet derived growth factor</i>
PDT	: <i>Photodynamic therapy</i>
Pps	: <i>Pulse per second</i>
PSO	: <i>Proximal subungual onychomycosis</i>
QOL	: <i>Quality of life</i>
REP-PCR	: <i>Repetitive Extragenic Palindromic Sequence Polymerase Chain Reaction</i>
RNA	: <i>Ribonucleic acid</i>
ROS	: <i>Reactive oxygen species</i>
RSM	: <i>Rapid sporulating medium</i>
SDA	: <i>Sabouraud dextrose agar medium</i>
spp	: <i>Species</i>
SWO	: <i>Superficial white onychomycosis</i>
<i>T. equinum</i>	: <i>Trichophyton equinum</i>
<i>T. erinacei</i>	: <i>Trichophyton erinacei</i>
<i>T. megninii</i>	: <i>Trichophyton megninii</i>
<i>T. rubrum</i>	: <i>Trichophyton rubrum</i>
<i>T. soudanense</i>	: <i>Trichophyton soudanense</i>
<i>T. tonsurans</i>	: <i>Trichophyton tonsurans</i>
<i>T. violaceum</i>	: <i>Trichophyton violaceum</i>
<i>T.mentagrophytes</i>	: <i>Trichophyton mentagrophytes</i>
TDO	: <i>Total dystrophic onychomycosis</i>
TNF	: <i>Tumour necrosis factor</i>
TRT	: <i>Thermal relaxation time</i>
YAG	: <i>Yttrium Aluminium Garnet</i>

INTRODUCTION

Onychomycosis is a common persistent fungal infection of the nail bed, matrix or plate. It is the most common nail disorder in adults, accounting for one third of all fungal skin infections and up to 50 percent of all nail diseases worldwide including psoriasis, atopic dermatitis, nail trauma, contact irritants, and lichen planus (*Schlefman, 1999 and Ghannoum, 2000*).

Toenails are affected more often than fingernails and the incidence is greater in older adults (*Evans, 1998*). Individuals who are especially susceptible include those with chronic diseases such as diabetes, circulatory problems, smokers, patients with psoriasis and those with diseases that suppress the immune system (e.g. HIV-positive patients, extremes of age, patients on long term corticosteroids therapy). Other risk factors include a family history, previous trauma to the nails, warm climate, and occlusive or tight footwear (*Gupta et al., 2004*).

The causative agents of onychomycosis include dermatophytes, to a lesser extent non dermatophyte moulds and rarely, yeasts of the *Candida* species (*Evans, 1998*).

Onychomycosis is classified clinically as distal and lateral subungual onychomycosis (DLSO), superficial white onychomycosis (SWO), proximal subungual onychomycosis