بسم الله الرحمن الرحيم

∞∞∞

تم رفع هذه الرسالة بواسطة / سلوي محمود عقل

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات:

.....

.....

.....

.....

.....

Salwa MAHMOUD Aki

تم بحمد الله

Evaluation of the Efficacy of Nanofat Injection in Treatment of Androgenic Alopecia

Thesis

Submitted for Partial Fulfillment of Master's Degree in Dermatology, Venereology & Andrology

By

Yara Amr Ahmed Nazmy

M.B, B.CH, Faculty of Medicine, Ain Shams University

Under supervision of

Prof. Dr. Hanan Mohamed El Kahky

Professor of Dermatology, Venereology and Andrology
Faculty of Medicine, Ain Shams University

Prof. Dr. Wael Mohamed Seoudy

Assistant Professor of Dermatology, Venereology and Andrology
Faculty of Medicine, Misr University for Science and Technology

Dr. Rania Mahmoud Elhusseiny

Lecturer of Dermatology, Venereology and Andrology
Faculty of Medicine, Ain Shams University

Faculty of Medicine
Ain Shams University
2021

بسم الله الرحمن الرحيم

وَقُل رَّبِّ

زِدْنِي عِلْماً

سورة طه

الاية (١١٤)

صَدَقَ اللهُ العَظِيم

Acknowledgment

First and foremost, I feel always indebted to ALLAH, the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to ***Prof. Dr. Hanan Mohamed El Kahky,*** *Professor of Dermatology, Venereology and Andrology - Faculty of Medicine- Ain Shams University for helping me choose this important and new subject and the continuous support.*

I am also delighted to express my deepest gratitude and thanks to ***Prof. Dr. Wael Mohamed Seoudy,*** *Assistant Professor of Dermatology, Venereology and Andrology, Faculty of Medicine, Misr University for Science and Technology for his kind care, great help and providing me with valuable advice.*

I am deeply thankful to ***Dr. Rania Mahmoud Elhusseiny,*** *Lecturer of Dermatology, Venereology and Andrology, Faculty of Medicine, Ain Shams University for her continuous supervision, patience, constant help and great assistance throughout this work.*

I would like to express my deepest gratitude for my parents for without them I would not be who I am today .

Last but not least, I would like to thank my family for supporting me throughout this journey and for always believing in me.

Yara Amr Ahmed Nazmy

List of Contents

Title	Page No.

List of Tables i
List of Figures ii
List of Abbreviations iv
Introduction 1
Aim of the Work 3
Review of Literature
Chapter 1: Androgenic Alopecia 4
- Epidemiology 4
- Etiology and Pathogenesis 5
- Role of androgen 7
- Role of estrogen 9
- Clinical Features 10
- Classification 10
- Clinical Diagnosis 12
- Differential diagnosis 15
- Therapeutic options 16

Chapter 2: Nanofat 24
- Introduction 24
- Types of fat 25
- Components of Nanofat 25
- Applications of Fat Grafting in Dermatology 27

Patients and Methods 31
Results 43
Discussion 64
Conclusion 69
Recommendations 70
Summary 71
References 73
Arabic Summary

List of Tables

Table No.	Title	Page No.
Table (1):	Summary of evidence level, efficacy, safety aspects and practicability for the most common therapeutic interventions	17
Table (2):	Non-surgical treatments for AGA	23
Table (3):	Demographic data and clinical characteristics of the studied patients	44
Table (4):	The correlation between age of patients or duration of AGA with the severity of AGA	45
Table (5):	Description of terminal hair density before nanofat injection, 3 months after injection and 6 months after nanofat injection	47
Table (6):	Description of Average Caliber of hair pre, 3 months after and 6 months after treatment	49
Table (7):	Description of average hair volume pre, 3 months after and 6 months after treatment	50
Table (8):	Evaluation of treatment response through patients' satisfaction and physician assessment	52
Table (9):	The correlation between treatment response (terminal hair density, average caliber, average volume with age and duration of disease)	54
Table (10):	correlation between treatment response and severity of AGA	55
Table (11):	Correlation between patients' demographic data and clinical characteristics with treatment response (assessed by physicians)	53
Table (12):	correlation between physician's assessment and dermoscopic assessment of treatment response	56
Table (13):	Nanofat adverse effects reported by the patients	57
Table (14):	Correlation between patients' satisfaction and demographic data	57
Table (15):	Correlation between patients' satisfaction and clinical characteristics	58
Table (16):	Correlation between patients' satisfaction and treatment response	59

List of Figures

Fig. No.	Title	Page No.

Figure (1): Different factors involved in the pathogenesis of androgenetic alopecia. 6
Figure (2): Role of Androgen in Androgenic Alopecia 7
Figure (3): Conversion of androgen to estrogen..... 9
Figure (4): Norwood-Hamilton Classification 11
Figure (5): Ludwig classification..... 12
Figure (6): Sinclair Classification 12
Figure (7): Trichoscopic findings in AGA. 14
Figure (8): Male patient with androgenic alopecia before and after nanofat injection 27
Figure (9): A 38-year-old patient with a hypertrophic scar before nanofat injection and b) after nanofat injection..... 27
Figure (10): A burn patient before and after nanofat treatment. The burn scar was injected with harvested fat. 28
Figure (11): Nanofat injection for periorbital area A before and after nanofat injection in the periorbital area 29
Figure (12): Hand rejuvenation A before and after picture of nanofat injection for hand rejuvenation 30
Figure (13): Defining the point to be photographed using a headband and a tapeline..... 37
Figure (14): The filtering device used in the study consists of 2 openings on both sides for syringes and comes with 3 grades of filters to use for macro, micro or nanofat..... 39
Figure (15): Syringes and cannulas used during nanofat preparation..... 39

List of Figures *(Cont...)*

Fig. No.	Title	Page No.
Figure (16):	Terminal hair density pre, 3 months after and 6 months after treatment	47
Figure (17):	IQR of average caliber of hair pre, 3 months post and 6 months after treatment	49
Figure (18):	Treatment response of the studied patients	52
Figure (19):	Correlation between patients' age and treatment satisfaction	58
Figure (20):	Correlation between duration of disease and patients'satisfaction	58
Figure (21):	A 44-year-old male patient with androgenic alopecia of 3 years duration, Norwood grade V before and after treatment	60
Figure (22):	A 41-year-old male patient with androgenic alopecia of 20 years duration, Norwood grade IV	61
Figure (23):	A 44-year-old female patient with androgenic alopecia of 10 year duration, Ludwig grade 3.	62
Figure (24):	A 50-year-old female patient with androgenic alopecia of 10 year duration, Ludwig grade 2	63

List of Abbreviations

Abb.	Full term
ad-MVFs	*Adipose-derived microvascular fragments*
ADSC	*Adipose Derived Stem Cells*
AGA	*Androgenic Alopecia*
APM	*Arrector pili muscle*
ASCs	*Adipose-derived stem cells*
bFGF	*Basic fibroblast factor*
BPPS	*Brown peripilar sign*
CTE	*Chronic telogen effluvium*
DHT	*Dihydrotestosterone*
DP	*Dermal papillae*
FAGA	*Female Androgenic Alopecia*
FDA	*Food and Drug Administration*
FFA	*Frontal fibrosing alopecia*
FPHL	*Female pattern hair loss*
FUT	*Follicular unit transplantation*
HS	*Highly significant*
HT	*Hair Transplantation*
IGF-1	*Insulin like growth factor*
IL-1α	*Interleukin 1 alpha*
IQR	*Interquartile range*
LLLT	*Low level laser therapy*
MAGA	*Male Androgenic Alopecia*
NS	*Non-significant*