

Potential Risk Factors among Egyptian Females with Androgenic Alopecia

Thesis

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Contents

	Page
Introduction	1
Aim of the work	2
Review of literature :	
- Normal anatomy and biology of the hair	3
-Alopecia	19
-Androgenetic alopecia	26
-Hair care	48
Subjects and methods	61
Results	66
Discussion	92
Summary and conclusions	100
Recommendations	103
References	104
Appendix	123
Arabic summary	

LIST OF TABLES

Review of literature

No.	Title	Page No.
1	Cytokines and endogenous hormones that affect hair growth	14
2	Laboratory work up for alopecia	24

Results

No.	Title	Page No.
1	Height, weight and BMI	67
2	Number of Children	68
3	Hair type of the patients	69
4	Wearing hejab and its fabric	69
5	Chemical application	70
6	Family history	71
7	Diet of preference	71
8	Association between BMI and onset of AGA	73
9	Association between educational attainment level and onset of AGA	74
10	Association between smoking and onset of AGA	75
11	Association between hair type and onset of AGA	76
12	Association between hair condition and onset of AGA	77
13	Association between wearing hejab and its fabric with onset of AGA	78
14	Association between hair wash using shampoo or soap with onset of AGA	79

No.	Title	Page No.
15	Association between hair conditioner use and onset of AGA	80
16	Association between family history and onset of AGA	81
17	Association between weight loss diet in the last 12 months and onset of AGA	82
18	Association between diet of preference and onset of AGA	83
19	Association between skin nature and onset of AGA	84
20	Association between anemia and onset of AGA	85
21	Association between stress and onset of AGA	86

LIST OF FIGURES

Review of literature

No.	Title	Page No.
1	The hair follicle in anagen phase	4
2	Morphology of the hair follicle	5
3	Ultrastructure of the hair follicle	7
4	The hair follicle in telogen phase	9
5	Development and cycling of hair follicles	11
6	Key stages of the hair cycle	12
7	Hamilton-Norwood classification	31
8	The Ludwig classification	32
9	The Ebling-Rook female pattern baldness classification system	34
10	Stepwise miniaturization of the hair follicle and shortening of the anagen growth phase, mediated by dihydrotestosterone	35

Results

No.	Title	Page No.
1	Pie chart showing early and late onset AGA	66
2	Pie chart showing Ludwig staging of the patients	67
3	Association between BMI and onset of AGA	73
4	Association between educational attainment level and onset of AGA	74
5	Association between smoking and onset of AGA	75
6	Association between hair type and onset AGA	76
7	Association between hair condition and onset of AGA	77
8	Association between wearing hejab and its fabric with onset of AGA	78

9	Association between hair wash using shampoo or soap with onset of AGA	79
10	Association between hair conditioner use and onset of AGA	80
11	Association between family history and onset of AGA	81
12	Association between weight loss diet in the last 12 months and onset of AGA.	82
13	Association between diet of preference and onset of AGA	83
14	Association between skin nature and onset of AGA	84
15	Association between anemia and onset of AGA	85
16	Association between stress and onset of AGA	86
17	Show some pictures of patients with AGA included in our study	88

LIST OF ABBREVIATIONS

5 α R	: 5 α -reductase
ACTH	:Adrenocorticotrophin
AGA	: Androgenetic alopecia
AMPs	: Acid mucopolysaccharides
ANA	: Antinuclear antibody
AR	: Androgen receptor
b	: Non balding
B	: Balding
BDNF	: Brain-derived neurotrophic factor
bFGF	: Basic fibroblast growth factor
BMI	:Body mass index
BPH	: Benign prostatic hyperplasia
CBC	: Complete blood cell count
DHEAS	: Dehydroepiandrosterone sulfate
DHT	: Dihydrotestosterone
EGF	: Epidermal growth factor
ESR	: Erythrocyte sedimentation rate
FDA	:Food and drug administration
FGF5	: Fibroblast growth factor type 5
FPHL	: Female pattern hair loss
FSH	: Follicle-stimulating hormone
HGF	: Hepatocyte Growth Factor
IGF-I	: Insulin-like growth factor I
IL-1- alpha	: Interleukin 1-alpha
IRS	: Inner root sheath
KGF	: Keratinocyte growth factor

KOH	: Potassium hydroxide
LH	: Luteinizing hormone
MPB	: Male pattern baldness
MPHL	: Male pattern hair loss
MSP	: Macrophage Stimulating Protein
NGF	: Nerve growth factor
NS	: Non significant
NT	: Neurotrophin
ORS	: Outer root sheath
PDGF	: Platelet-derived growth factor
PCO	: Polycystic ovary
PRP	: Platelet rich plasma
PTH	: Parathyroid hormone
RF	: Rheumatoid factor
S	: Significant
SHBG	: Sex hormone-binding globulin
Sig	: Significance
SLE	: Systemic Lupus Erythematosus
T	: Testosterone
T ₄	: Thyroxin
TGF- beta	: Transforming growth factor beta
TIBC	: Total iron-binding capacity
TSH	: Thyroid-stimulating hormone
UV	: Ultraviolet radiation
VEGF	: Vascular Endothelial Growth Factor
Y	: Years

INTRODUCTION

Androgenetic alopecia (AGA) is a type of hair loss which occurs in genetically susceptible men and women in a specific pattern. Andro in the word of androgenetic depicts the effect of androgens such as testosterone and dihydrotestosterone whereas genetics refers to the fact that genes for AGA are inherited from one or both parents (*Milan, 2002*).

Androgenetic alopecia is the most common type of alopecia in both men and women (*Lescko et al., 1993*). Ludwig, 1977 noted that features of AGA in women differed from those in men, and made a classification to score female pattern hair loss (*Ludwig, 1977*). Female pattern AGA causes diffuse thinning of the hair at and behind the hairline, but there is no recession of the hair line (*Norwood, 1975*).

A number of studies have shown that AGA is associated with poor quality of life scores on disease specific quality of life questionnaire (*Schmidt, 2003*). Some environmental factors such as smoking have positive association with AGA. Family history has a static significant association with the risk of early onset AGA (*Su and chen, 2007*).

A study done by Arias-Santiago and colleagues in 2010 confirmed the association between early onset AGA and higher cardiovascular risk in females (*Santiago et al., 2010*).

AIM OF THE WORK

To search for possible potential risk factors among Egyptian females with AGA.

NORMAL ANATOMY AND BIOLOGY OF THE HAIR

Hair has many useful biologic functions, including protection from the environment and dispersion of sweat-gland products (e.g., pheromones). It also has psychosocial importance in our society, and patients with hair loss (alopecia) or excessive hair growth often suffer tremendously (*Paus and Cotsarelis, 1999*).

The hair follicle, a unique characteristic of mammals, represents a stem cell-rich, phenotypic neuroectodermal-mesodermal interaction system. This factory for pigmented epithelial fibers is unique in that it is the only organ in the mammalian body which, for its entire life time, undergoes cyclic transformation from stage of rapid growth (anagen) to apoptosis-driven regression (catagen) and back to anagen, via an interspersed period of relative quiescence (telogen) (*Paus and Fiotzik, 2004*).

Anatomy of the hair follicle:

The hair follicle can be divided into 3 regions: the lower segment (bulb and suprabulb), the middle segment (isthmus), and the upper segment (infundibulum). The lower segment extends from the base of the follicle to the insertion of the erector pili muscle, the middle segment from the insertion of the erector pili muscle to the entrance of the sebaceous gland duct, and the upper segment from the entrance of the sebaceous gland duct to the follicular orifice, figure 1 (*Shapiro, 2002*).

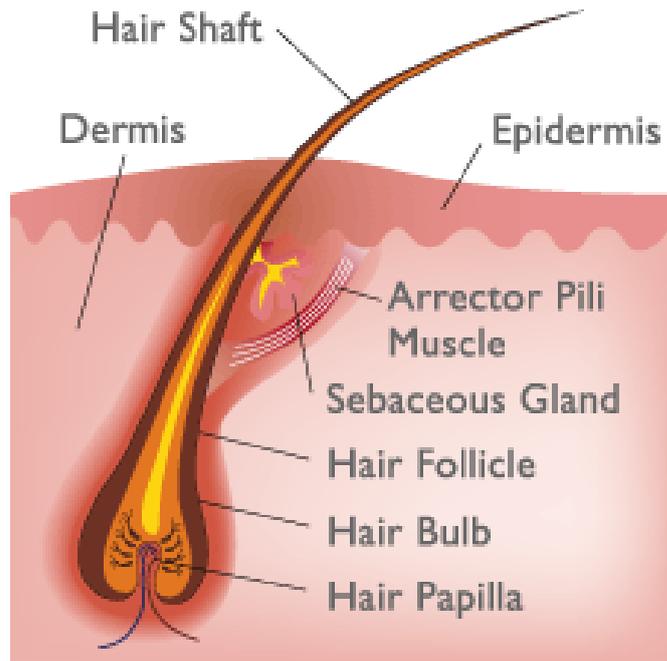


Fig. (1) The hair follicle (anagen phase) (*Tiede et al., 2007*)

Microanatomy of the anagen phase hair:

The bulb encompasses the dermal papilla and the hair matrix. The dermal papilla consists of an egg-shaped accumulation of mesenchymal cells surrounded by ground substance that is rich in acid mucopolysaccharides (AMPs). The papilla protrudes into the hair bulb and is responsible for directing hair growth (*Tiede, et al., 2007*).

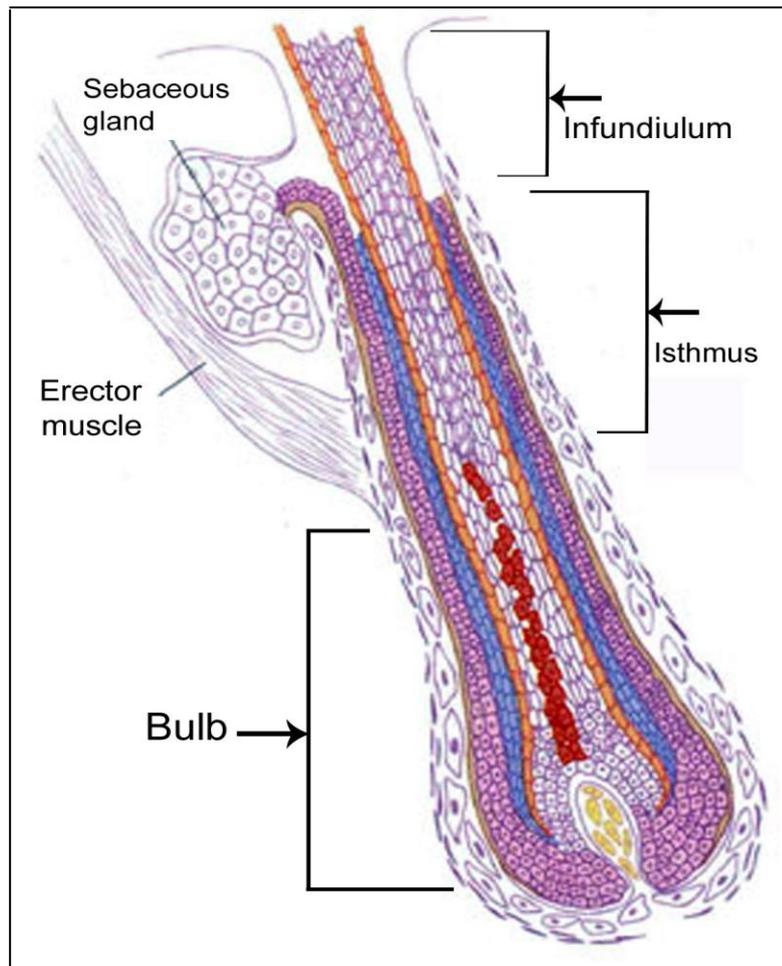


Fig. (2) Morphology of the hair follicle (Caserio, 1987).

The lower part of the dermal papilla is connected to the fibrous root sheet. The hair matrix surrounds the top and sides of the dermal papilla, melanin can be found in abundance within the melanophages of the dermal papilla. Melanin is transferred from these melanocytes into the cells that make up the hair shaft and is responsible for the color of the hair according to its quantity (*Hashimoto, 1988*).

The hair matrix is the actively growing portion of the follicle consisting of a collection of epidermal cells that rapidly divide, move upward, and give rise to the hair shaft and the internal root sheath (*Sperling, 1991*).

Inner root sheath

The inner root sheath (IRS) is closely apposed to the hair shaft, and, because the sheath contains no pigment, it can easily be