بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

Assessment of Serum Apelin Levels and its Relation to Insulin Resistance in Acne Vulgaris Patients

Thesis

Submitted for Partial Fulfillment of master's degree in
Dermatology, Venereology and Andrology

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Rana Safwat Moustafa Abdel-hamid

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List of Abbreviations

Abb.	Full term
ACE	*Angiotensin converting enzyme*
ACTH	*Adrenocorticotropic hormone*
AMPK	*AMP activated protein kinase*
APLN	*Apelin*
AR	*Apelin receptor*
AV	*Acne vulgaris*
BMI	*Body mass index*
C.acnes	*Cutibacterium acnes*
CI	*Confidence interval*
DHEA	*Dehydroepiandrosterone*
DHT	*Dihydrotestosterone*
EC	*Endothelial cell*
eNos	*Endothelial nitric oxide synthase*
FFA	*Free fatty acids*
FOXO	*Fork head box proteins*
FSH	*Follicule stimulating hormone*
GH	*Growth hormone*
GLP-1	*Glucagon like peptide 1*
HOMA-IR	*Homeostatic Model Assessment for Insulin Resistance*
IFN	*Interferon*
IGF	*Insulin like growth factor*
IL steroid	*Intra lesional steroids*
IL	*Interleukin*
LH	*Luteinizing hormone*

List of Abbreviations (Cont...)

Abb.	Full term
MRSS	*Modified Rodnan skin score*
NLRP3	*Nod like receptor p3*
NO	*Nitric oxide*
OR	*Odds ratio*
P.acnes	*Propionibacterium acnes*
PI3K/AKT	*phosphatidylinositol 3-kinase /protein kinase B*
PRL	*Prolactin*
Pyr-apelin 13	*Pyroglutamate apelin 13*
RAMBAS	*Retinoic acid metabolism blocking agents*
RAR	*Retinoic acid receptor*
ROS	*Reactive oxygen species*
SAHA	*Seborrhea-Acne-Hirsutism-Alopecia*
SSc	*Systemic sclerosis*
TGF-B	*Transforming growth factor -B*
TH	*T helper cells*
TNF	*Tumor necrosis factor*
VEGF	*Vascular endothrlial growth factor*

1. INTRODUCTION

Acne vulgaris (AV) is the most common skin disorder affecting adolescents and young adults. It commonly affects the face, neck, and upper trunk**.** Even though it is not a life-threatening disease, it can produce cutaneous and emotional scars ***(Yentzer et al., 2010; Barnes et al., 2012)*****.**

Acne vulgaris is an inflammatory disease of pilosebaceous glands that mostly occurs during puberty. Hyperandrogenemia and hyperinsulinemia among other factors cause AV. Androgens have been found to increase sebaceous glands' size, sebum production and induce keratinocyte proliferation ***(Nagpal et al., 2016)*****.**

The pathogenesis of acne is multifactorial and not completely understood. Several hormones implicated in the regulation of sebaceous gland activity have been related to acne. These include androgens, estrogens, progesterone, growth hormone, insulin and insulin-like growth factor-1 (IGF-1)**.** Insulin and I*GF-1* have been shown to stimulate adrenal androgen synthesis and inhibit the hepatic production of sex hormone-binding globulin, allowing for an increase in androgen bioavailability ***(Dao et al., 2007; Suh et al., 2015; Eichenfield et al., 2015)*****.**

Insulin resistance results from reduced responsiveness of target cells to insulin. During puberty, the physiologic insulin resistance leads to hyperinsulinemia, and subsequently increases the androgen synthesis. Hyperinsulinemia also induces acne formation through increasing free insulin‐like growth factor 1 (IGF‐1) and decreasing insulin‐like growth factor binding protein 3 levels. IGF-1 increases the mean facial sebum excretion rate, serum dihydrotestosterone and dehydroepiandrosterone sulfate levels, and stimulates sebocyte proliferation. Also, hyperinsulinemia elevates the epidermal growth factors and transforming growth factor β levels, which increases plasma non-esterified fatty acids levels, that in turn leads to inflammation and acne ***(LeRoith et al., 2003; Vora et al., 2008; Borisov et al., 2009).*** Insulin resistance has a wide range of skin manifestations such as acrochordons, acanthosis nigricans, androgenetic alopecia, acne, and hirsutism ***(González‐Saldivar et al., 2017; Mustafa and El‐Shimi, 2018).***

Adipokines are adipocyte‐derived regulatory hormones. Studies reported that sebocyte as well as adipocyte share the expression of some adipogenic factors as galectin‐12, resistin, stearoyl‐CoA desaturase (SCD), sterol response element binding protein‐1(SREBP‐1) ***(Harrison et al., 2007).*** Apelin is one of the adipokines. It is a peptide which was initially discovered in1998 and also, known as (APLN) and in humans is encoded by the *APLN* gene. It is widely expressed in various organs such as the heart, lung, kidney, liver, adipose tissue, brain, gastrointestinal tract, adrenal glands, endothelium and human plasma ***(Tatemoto et al., 1988).***

Apelin is suggested to improve insulin resistance via triggering a number of coordinated beneficial effects including reduction of hyperinsulinemia and adiposity, and stimulation of glucose uptake and fuel consumption ***(Castan-Laurell et al., 2012).*** As regarding dermatological diseases, serum apelin 36 levels was found to be lowered in psoriatic patients with increased insulin resistance ***(Capo et al., 2018).***

In the current study, we aimed to be the first to evaluate serum apelin level in AV patients as an attempt to answer the question about its role and its possible relation to insulin resistance in AV pathogenesis and severity.

2. Aim of the Work

Our aim was to evaluate serum apelin levels and reveal the possible relation between its serum levels and the insulin resistance status in acne vulgaris patients.