

Assessment of Serum Level of Vitamin D in Acne Vulgaris

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Contents

	Page
➤ Acknowledgment.....	I
➤ Abstract	II
➤ List of abbreviations.....	III
➤ List of figures.....	VI
➤ List of tables.....	VIII
➤ Introduction and Aim of work.....	1
➤ Review of literature.....	4
➤ Chapter 1: Acne Vulgaris.....	4
➤ Chapter 2: Pathogenesis of Acne.....	17
➤ Chapter 3: Vitamin D.....	33
➤ Patients and methods.....	43
➤ Results.....	50
➤ Discussion.....	64
➤ Recommendations.....	70
➤ Summary.....	71
➤ References.....	74
➤ Arabic summary	

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Abstract

Background: Acne is a chronic inflammatory disease of the pilosebaceous units with multifactorial pathogenesis. Sebocytes were identified as bioactive vitamin D-responsive target cells, suggesting a possible role for vitamin D in the pathogenesis of acne.

Objectives: The aim of this study was to evaluate serum levels of 25-hydroxy vitamin D (25 OH D) in a group of Egyptian patients with acne vulgaris in comparison to controls, in order to shed more light on its possible role in the pathogenesis and detect any relation between vitamin D and acne severity.

Patients and methods: This study included 60 patients with acne vulgaris and 60 age and sex matched healthy controls. Blood samples were taken from all participants for the detection of serum 25 OH D levels by enzyme-linked immunosorbent assay (ELISA).

Results: The present study revealed lower serum vitamin D levels in acne patients in comparison to controls, however, the difference did not reach statistical significance ($p=0.226$). In addition, the levels were lowest in severe acne with no significant difference ($p=0.127$).

Conclusion: The present study revealed lower, although non-significant, serum vitamin D levels in acne patients, suggesting a possible role for vitamin D supplementation in acne treatment.

Keywords: Acne vulgaris- Vitamin D.

List of abbreviations

1,25 (OH)₂ D: 1,25-dihydroxy vitamin D

25 OH D: 25-hydroxy vitamin D

5 α -DHT: 5 α -dihydrotestosterone

AAS: androgenic anabolic steroids

AR: Androgen receptor

CAMP: cathelicidin antimicrobial peptide

COX: Cyclooxygenase

CRH: Corticotropin releasing hormone

DHEA: dehydroepiandrosterone

EGF: Epidermal growth factor

ELISA: enzyme-linked immunosorbent assay

FGF: Fibroblast growth factor

FOXO1: Forkhead box protein O1

FSH: follicle stimulating hormone

GH: Growth hormone

H β D: human β defensin

IGF-I: Insulin-like growth factor-I

IL: Interleukin

IOM: Institute of Medicine

LH: luteinizing hormone

LOX: Lipoxygenase

MAPK: mitogen-activated protein kinase

MMPs: matrix metalloproteinases

NF- κ B: Nuclear factor kappa B

P. acnes: Propionibacterium acnes

PAMPs: pathogen-associated molecular patterns

PAR- 2: Protease-activated receptor-2

PCOS: polycystic ovary syndrome

PCR: polymerase chain reaction

PIH: Post-inflammatory hyperpigmentation

POMC: Proopiomelanocortin

PPARs: Peroxisome proliferator activated receptors

PRRs: pattern recognition receptors

PTH: parathyroid hormone

RXR: retinoid X receptor

SD: standard deviation

SZA: Solar zenith angles.

TGF- β : transforming growth factor beta

TLRs: Toll-like receptors

TNF- α : Tumour necrosis factor- α

Tregs: T regulatory cells

UV: Ultraviolet

VD2: vitamin D2

VD3: vitamin D3

VDR: vitamin D receptor

VDREs: vitamin D response elements

ω-3: omega-3

ω-6: omega-6

List of figures

Figure (1): Modern aspects of the pathogenesis of acne. (p20)

Figure (2): Mechanism of hyperkeratinization. (p23)

Figure (3): Innate Immune Response in Acne. (p25)

Figure (4): P. acnes effect on innate immunity. (p28)

Figure (5): The different sources and forms of vitamin D. (p35)

Figure (6): Effects of Vitamin D on the Immune system. (p39)

Figure (7): Severity of acne vulgaris in patients included in the study. (p51)

Figure (8): Comparison between male and female acne vulgaris patients regarding serum vitamin D level. (p53)

Figure (9): Comparison between patients with mild, moderate and severe acne regarding serum vitamin D level. (p56)

Figure (10): Comparison between male and female controls regarding serum vitamin D. (p57)

Figure (11): Vitamin D status in male and female controls. (p58)

Figure (12): Comparison between controls with adequate and those with inadequate sun exposure regarding vitamin D status. (p60)

Figure (13): Comparison between acne vulgaris patients and controls regarding sun exposure. (p61)

Figure (14): Comparison between acne vulgaris patients and controls regarding serum vitamin D. (p62)

Figure (15): Comparison between acne vulgaris patients and controls regarding vitamin D status. (p63)

List of tables

Table (1): Targets of acne treatments. (p12)

Table (2): Treatment algorithm for acne. (p16)

Table (3): Clinical and laboratory data of the studied groups. (p52)

Table (4): Comparison between male and female acne vulgaris patients regarding serum vitamin D level. (p53)

Table (5): Comparison between male and female acne vulgaris patients regarding vitamin D status. (p54)

Table (6): Comparison between acne vulgaris patients with adequate and those with inadequate sun exposure regarding serum vitamin D level. (p54)

Table (7): Comparison between acne vulgaris patients with adequate and those with inadequate sun exposure regarding vitamin D status. (p55)

Table (8): Comparison between patients with mild, moderate and severe acne regarding serum vitamin D level. (p55)

Table (9): Comparison between acne vulgaris patients with mild, moderate and severe acne regarding vitamin D status. (p56)

Table (10): Comparison between male and female controls regarding serum vitamin D. (p57)

Table (11): Comparison between male and female controls regarding vitamin D status. (p58)

Table (12): Comparison between controls with adequate and those with inadequate sun exposure regarding serum vitamin D level. (p59)

Table (13): Comparison between controls with adequate and those with inadequate sun exposure regarding vitamin D status. (p59)

Table (14): Comparison between acne vulgaris patients and controls regarding sun exposure. (p60)

Table (15): Comparison between acne vulgaris patients and controls regarding serum vitamin D. (p61)

Table (16): Comparison between AV patients and controls regarding vitamin D status. (p62)

Table (17): Correlation between the duration of the disease and serum vitamin D of acne vulgaris patients. (p63)

Introduction and Aim of the Work

Introduction

Acne vulgaris is a chronic multifactorial pleomorphic inflammatory, exclusively human disease of the sebaceous gland follicles located on the face, chest, shoulders and back, where they are most common (**Wilcox et al., 2007**).

Acne vulgaris is characterized by seborrhoea, the formation of comedones, erythematous papules and pustules, less frequently by nodules, deep pustules, or pseudocysts and, in some patients, is accompanied by scarring (**Adityan et al., 2009**).

Acne is a multifactorial disease involving alterations in the pattern of keratinization within pilosebaceous follicles, resulting in comedo formation, increased sebum production, the proliferation of *Propionibacterium* (P.) *acnes* and peri-follicular inflammation. *P. acnes* has been shown to stimulate the production of inflammatory cytokines such as interleukin-8 (IL-8), tumour necrosis factor- α (TNF- α) and IL-1 β in acne patients (**Agak et al., 2014**).

Vitamin D is a steroid hormone synthesized in the epidermal keratinocytes under influence of ultraviolet- B (UV-B) light (290-315 nm) or acquired in the diet and dietary supplements (**Bouillon et al., 2008**).

Sebocytes were identified as bioactive vitamin D-responsive target cells, suggesting a possible role for vitamin D in acne (**Reichrath et al., 2007**).

In addition, the active form of vitamin D, 1,25-dihydroxy vitamin D (1,25 (OH)₂ D), has multiple effects on innate and adaptive immune responses through its varied effects on T and B lymphocytes, macrophages and dendritic cells, all of which express vitamin D receptors (**Kim et al, 2007, Adorini and Penna, 2008**). As such, the impact of vitamin D on human physiology and disease is broad and there is wide interest in the role of this hormone in many areas of medicine (**Gorman et al, 2007**).

The relation between vitamin D level and acne vulgaris and whether vitamin D supplementation helps in the treatment of acne vulgaris represent an attractive area of research.