Assessment of Serum Level of Vitamin D in Acne Vulgaris

Thesis
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By

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Contents

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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

5α-DHT: 5α-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

HβD: human β defensin

IGF-I: Insulin-like growth factor-I

IL: Interleukin

IOM: Institute of Medicine

LH: luteinizing hormone

LOX: Lipooxygenase

MAPK: mitogen-activated protein kinase

MMPs: matrix metalloproteinases

NF-κB: 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

List of tables

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 pilosebaseous 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 **i**nterleukin-8 (IL-8), tumour necrosis factor- α (TNF-α) and IL-1β 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.