

## Assessment of Serum Level of lipocalin2 in Patients with Acne Vulgaris

N.E.Sorour<sup>1</sup>, A.M.Hamed<sup>2</sup>, E.G.Behery<sup>3</sup>, E.M.Elsayed<sup>4</sup>

<sup>1</sup> Assistant Professor of Dermatology, Venereology and Andrology Dept., Faculty of Medicine, Benha Univ., Benha, Egypt

<sup>2</sup> Assistant Professor of Clinical and Chemical Pathology Dept., Faculty of Medicine, Benha Univ., Benha, Egypt

<sup>3</sup> Assistant Professor of Dermatology, Venereology and Andrology Dept., Faculty of Medicine, Benha Univ., Benha, Egypt

<sup>4</sup>(M.B.B.CH), Faculty of Medicine , Zagazig Univ., Zagazig, Egypt  
E-Mail: esraar001988@gmail.com

### Abstract

Acne vulgaris(AV) is a chronic disease of the pilosebaceous unit which is most common during adolescence. Four factors are believed to play a key role in the development of acne lesions: excess sebum production, disturbed keratinization within the follicle, colonization of the pilosebaceous duct by *Propionibacterium acnes*, and the release of inflammatory mediators into the skin. Evaluation of serum levels of lipocalin2(LCN2) in acne vulgaris patients. Serum LCN2 concentrations were measured in 30 patients with AV and 30 healthy controls using enzyme-linked immunosorbent assay (ELISA). Serum levels of LCN2 in patients with AV were found to be higher than in healthy controls ( $p < 0.001$ ). Increased serum LCN2 probably reflect the role of LCN2 in the pathogenesis of AV.

**Keywords:** Acne vulgaris, LCN2, ELISA.

### 1. Introduction

Acne vulgaris (AV) is a common chronic inflammatory skin disease of the pilosebaceous units affecting adolescents targeting individuals' face, chest and back and characterized by formation of open and closed comedones, erythematous papules, pustules and less frequently by nodules or pseudocyst [1].

Multiple factors are involved in the pathophysiology of acne, including: an alteration in the pattern of keratinization within the pilosebaceous follicles resulting in comedone formation, an increase in sebum production which is influenced by androgens, the proliferation of *Propionibacterium acnes*, and the production of perifollicular inflammation ,but still genetic and hormonal factors may also contribute to acne formation [2].

Common links between acne and its comorbidities mainly involve the chronic inflammation that emerges from metabolic tissues (metaflammation), genetic basis, similar pathways of immune disorders, and bioactive substances synthesized and secreted by adipose tissue. There is a potential role of various adipokines in the development of acne and its comorbidities [3].

lipocalin 2 (LCN2) , also known as neutrophil gelatinase-associated lipocalin (NGAL) , siderocalin, and 24p3, is a secretory glycoprotein, belongs to the lipocalin family,

the members of which bind various hydrophobic molecules, including retinoids, steroids, and fatty acids [4].

Adipocytes secrete a wide array of proteins that influence systemic metabolism. These include factors that promote insulin sensitivity as well as others that induce insulin resistance. lipocalin 2 (LCN2) is an adipokine expressed in adipocytes, that its expression is regulated by obesity, and it induces insulin resistance [5].

The expression and secretion of Lipocalin-2 increase sharply after conversion of preadipocytes to mature adipocytes. Its expression can be induced by various inflammatory stimuli, including lipopolysaccharide and IL-1 $\beta$  suggesting that lipocalin-2 may participate in inflammation-related disorders [6].

So increase level of LCN2 may play a role in the pathogenesis of acne vulgaris, The aim of this study is to evaluate the role of lipocalin-2 in acne vulgaris .

### 2. Material and methods

This comparative case control study included 30 patients with acne vulgaris and 30 healthy, age and sex matched controls attending the dermatology outpatient clinic at Benha University Hospital, Benha, Egypt from September 2018 to December 2018. Participants gave their informed written consent before enrolment and the study was approved

by the Research Ethics Committee in Faculty of Medicine, Benha University.

### 2.1 History taking

Patients' demographic data were recorded: name, age and marital status. A detailed history was taken from patients regarding onset, course, duration and recurrence of acne. Ask about medical problems including any systemic or skin diseases or drug intake.

### 2.2 Clinical examination

Complete general examination was done including body mass index.

Full general examination to exclude associated systemic diseases such as diabetes mellitus, and other inflammatory diseases, Detailed dermatological examination; to evaluate clinical variant, severity of AV and presence of acne scars. Patients were divided according to GAGS into three groups, Mild (10 patients), moderate (10 patients) and severe (10 patients).

### 2.3 blood samples

Blood samples were obtained and samples were allowed to clot for two hours at room temperature before centrifugation for 15

minutes at 1000 ×g. We removed serum and did assay immediately and we stored samples at -20°C or -80°C. we avoided repeated freeze-thaw cycles. After centrifugation, serum was separated by a pipette, divided and kept in eppendorf tubes labeled with the number of the person.

This test was done using Human Neutrophil Gelatinase Associated Lipocalin (NGAL) ELISA Kit provided by Sun Red Bio (Shanghai-China) according to the manufacturer's instructions.

### 2.4 Statistical Analysis

The collected data were tabulated and analyzed using SPSS version 16 soft ware (SpssInc, Chicago, ILL Company).

## 3. Results and discussion

### 3.1 Laboratory results

The current study was carried out on 30 patients with acne vulgaris. The control group included 30 healthy subjects.

There was a statistically significant higher in the Mean serum level of VEGF in patients than controls Table (1).

**Table (1)** Comparison serum NGAL concentration between all studied groups

	<b>Acne vulgaris</b>	<b>Control</b>	<b>P</b>
	<b>N=30</b>	<b>N=30</b>	
	<b>mean±SD</b>	<b>mean±SD</b>	
<b>NGAL (ng/mL)</b>	290.0 ± 220.0	92.6 ± 67.6	< 0.001

### 3.2 Discussion

Acne vulgaris is a common skin disease characterized by hormonally mediated sebum over production, follicular hyperkeratinization and chronic inflammation of the pilosebaceous unit [7].

Lipocalin 2, also known as an acute phase protein, that has become increasingly relevant biomarker in inflammatory diseases. LCN2 levels in biological fluids are generally low, being upregulated in inflammatory state, which strongly indicates the potential of its use as a biomarker of disease onset and progression [8].

The aim of this work was to estimate serum level of lipocalin2 to assess its role in acne vulgaris and to detect its correlation with severity and activity of the disease.

This was done through evaluation of 30 patients (7 males and 23 females). The patients were subdivided into three groups according to

the severity of their acne; mild acne group (n=10), moderate (n=10) and severe acne group (n=10). 30 healthy acne-free (7 males and 23 females) individuals were enrolled as a control group.

According to results of the current study, there was a statistically significant increase (p<0.001) in serum lipocalin2 level among cases compared to control group.

To the best of our knowledge, no published studies were found to compare the results between AV patients concerning serum lipocalin2 levels.

The results of the present study agreed with the results of the study conducted by Watanabe et al. [9]; who found that there was a significant decrease in the stratum corneum neutrophil gelatinase-associated lipocalin (SC NGAL)

level on the cheek after treatment of AV ( $P = 0.038$ ).

The role of lipocalin in AV can be explained in several ways, AV is characterized by chronic inflammation of pilosebaceous unit [10], and has been identified as a member of the family of metabolic diseases, such as obesity, type 2 diabetes mellitus, and cancer [11]. Also some studies have reported the association between serum LCN2 concentrations and various metabolic parameters and inflammatory markers [12]; [13]; [14].

Although the role of Lcn2 in inflammation is appreciated, its involvement in the pathogenesis of acne has not been well elucidated. However, a line of evidence suggests the pathogenic role of Lcn2 in acne. For example, TNF  $\alpha$  is a strong inducer of LCN2 Production [15], TNF  $\alpha$  also plays an important role in many stages in the pathogenesis of AV, and is considered one of the proinflammatory cytokines that is critically important in the modulation of MMP activation in the dermis during acne inflammation [16].

Consistent with this idea, it is not surprising that this study found increased serum levels of lipocalin 2 in AV, which is due to the presence of these excessive inflammatory cells in AV which also a major source of lipocalin 2 production.

#### 4. Conclusion

Our results showed the contribution of increased lipocalin 2 in the development of acne vulgaris.

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