The Assessment of Frequency and Severity of Acne Vulgaris among A Group of Tikrit Medical College Students and its Relation with Body Mass Index; A Cross-Sectional Study

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Abstract:

Background: Acne vulgaris is a common disease that affects the majority of the adolescent population and a large number of young adults with (90%) of all teenagers being affected by some degree. Androgens have been shown to play an important role in sebum production, and sebum over production, which in turn, is one of the primary pathogenic factors in acne formation. Obesity and overweight are often accompanied by peripheral hyperandrogenism. Body mass index (BMI) is frequently used to define these disorders clinically.

Aim of study: To assess the frequency and severity of acne vulgaris among Tikrit Medical College students and its relation with Body Mass Index.

Patients and Methods: A cross sectional study that done in Tikrit Medical College during the period extending from the first of February 2017 to the end of June 2017, 153 students are included, each of them was assessed by a prepared questionnaire, students are examined clinically of acne lesions, its severity and classified in to mild, moderate, severe and very severe according to the global acne grading system, BMI is measured for each student with acne vulgaris according to World Health Organization definition by checking weight and height.

Results: All over frequency of acne vulgaris was (46%) among a group of Tikrit Medical College students, (62%) of them were females, (38%) of them were males, mild acne represent (52%), of study cases, (65%) of cases was within normal weight. There was extremely significant relation between BMI, family history and severity of acne (p value<0.0001). There was no statistically significant relation between gender and severity of acne vulgaris (p value 0.138), no significant relation between smoking and severity of acne (p value 0.5).

Conclusions: After age of puberty, the frequency of acne vulgaris decreased significantly as the age increased. BMI and family history of acne could be risk factors for increase severity of acne vulgaris. No effect of smoking on severity of acne vulgaris.

Keywords: Acne, body mass index.

Introduction:

Acne vulgaris is chronic inflammatory, self-limiting disease of pilosebaceous unit, characterized by the formation ofcomedons, erythematous papules, pustules and sometimes nodules on the face, neck, upper trunk and upper arms, and as sequel of active lesions by scar formation, dyspigmentation and emotional problems [1, 2].

It is a multifactorial disease and its pathophysiology centers on the interplay of follicular hyperkeratinization, colonization. With Propionibacterium acnes, increased sebum production, and

inflammation. Androgens have long been recognized to stimulate sebaceous glands for the production of sebum, while hyperandrogenism is closely associated with acne formation [3].

Acne vulgaris is fairly common and affects (85%-100%) of the population at some part of their lives. It is commonly found during adolescence and sometimes continues into adulthood with a peak incidence during adolescence, acne affects approximately (85%) of young people between 12 and 24 years of age and is therefore a physiologic occurrence in this group. Although it is typically thought of as a disease of youth, acne often continues to be problematic well into adulthood. Caucasian boys and men have a tendency to have more severe nodulocystic disease than other groups [4]. Acne is common in North American whites. Spanish persons tend to more commonly develop cystic acne. African Americans have a higher prevalence of pomade acne, likely stemming from the use of hair pomades [1, 4].

During adolescence, acne vulgaris is more common in males than in females. In adulthood, acne vulgaris is more common in women than in men [4]. It may be present in the first few weeks and months of life, when a newborn is still under the influence of maternal hormones and when the androgen-producing portion of the adrenal gland is disproportionately large. This neonatal acne tends to resolve spontaneously [4]. However, some neonates may require therapy, for example use of topical retinoid. Adolescent acne usually begins with the onset of puberty, when the gonads begin to produce and release more androgen hormone. Acne is not limited to adolescence [1, 5].

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health [6]. People are generally considered obese when their body mass index (BMI), a measurement obtained by dividing a person's weight by the square of the person's height, is over 30 kg/m2, with the range 25–30 kg/m2 defined as overweight [6].

The WHO regards a BMI of less than 18.5 as underweight and may indicate malnutrition, an eating disorder, or other health problems, while a BMI equal to or greater than 25 is considered overweight and above 30 is considered obese [7].

Obesity is one of the biggest problems in western life style. In 2008, the World Health Organization (WHO) estimated that (35%) of adults (aged 20 years or more) were overweight all around the world. Initially, it was believed that overweight and obesity is a problem that occurs in high-income countries while nowadays, this problem is increasing in low and middle-income countries [8].

Obesity has a dramatic influence on the level of free testosterone levels and sex hormone binding globulin (SHBG). In the studies on obese women, higher levels of testosterone, lower levels of SHBG and also higher androgen index is observed than thin women [9]. A higher body mass index (BMI) is associated with an increased incidence of polycystic ovary syndrome (PCOS) that presents with hyperandrogenism, acne, hirsutism and menstrual irregularities; also, obese women with PCOS have a more severe clinical presentation of hyperandrogenism rather than thin women suffering from this disease [10].

Obesity affects skin physiology through changing the barrier function of the

skin, lipid production, sweat glands and lymphatic function, collagen formation, wound healing, subcutaneous fat, and microscopic and macroscopic blood circulation [11].

Since fat tissue is the site of androgen production [12], the undeniable role of obesity in peripheral hyperandrogenism is clear (as mentioned in PCOS) and the effect of hyperandrogenism on increased activity of the sebaceous glands and more oil production, as an important factor in acne development, is obvious [13].

Patients and Methods:

A cross sectional study that done in Tikrit Medical College during the period extending from the first of February 2017 to the end of June 2017, 153 students are included, each of them was assessed by a prepared questionnaire, students are examined clinically of acne lesions , its severity and classified in to mild, moderate, severe and very severe according to the global acne grading system table (1) [14], BMI is measured for each student with acne vulgaris according to World Health Organization definition by checking weight and height table (2).

Results:

The total number of students with acne vulgaris was 153, the mean age of students was 20.8 $\pm$1.7 years, all over frequency of acne vulgaris was (46%) among a group of Tikrit Medical College students, (62%) of them were females, (38%) of them were males, female to male ratio 1.6:1, mild acne represent (52%), moderate acne (42%), severe acne (5%), while very severe acne represent (1%) of study cases. The mean of BMI in the study was 23.6 $\pm$ 3.1 kg/m^2, (65%) of cases was within normal weight, (28%) within overweight, (4%) within obese and (3%) within under weight.

The study finds that no statistically significant relation between gender and severity of acne vulgaris. Chi-Square = 5.503, D F = 3, P-Value = 0.1383 table (3).

There was extremely significant relation between BMI and severity of acne in the study, Chi-square = 44.91, D F= 9, P value = < 0.0001 table (4).

In the study there was extremely significant relation between family history and severity of acne. Chi-square = 24.552 D F = 3 P value = <0.0001 table (5).

As most of the study samples were females and all of them were not smoker so we excluded females to find exact relation between smoking and severity of acne, there was no statistically significant relation between smoking and severity of acne. Chi-square = 2.29 D F= 3 P value=0.514 > 0.05 table (6).

Table (1): The global acne grading system [23].

Location	Factor
Forehead	2
Right cheek	2
Left cheek	2
Nose	1
Chin	1
Chest and upper back	3

Note: each type of lesion is given a value depending on severity: no lesions = 0, comedones = 1, papules =2, pustules = 3 and nodules = 4. The score for each area (local score) is calculated using the formula: local score = factor ×grade (0-4). The global score is the Sum of local scores, and acne severity was graded using the global score. A score of 1-18 is considered mild, 19-30 moderate, 31-38 severe and > 39 very severe.

Table (2): WHO classification of weight status.

WHO CLASSIFICATION OF WEIGHT STATUS	
WEIGHT STATUS	**BODY MASS INDEX (BMI), kg/m²**
Underweight	<18.5
Normal range	18.5 – 24.9
Overweight	25.0 – 29.9
Obese	≥ 30
Obese class I	30.0 – 34.9
Obese class II	35.0 – 39.9
Obese class III	≥ 40

Table (3): Distribution of acne vulgaris according to gender in relation to severity of acne among Tikrit medical College students.

Severity / Gender	Mild	%	Moderate	%	Severe	%	Very Severe	%	Total
Male	28	35.5	27	41.5	1	14.2	2	100	58
Female	51	64.5	38	58.5	6	85.8	0	0.0	95
Total	79	100	65	100	7	100	2	100	153

Table (4): Distribution of study cases according to BMI in relation to severity of acne.

Severity / BMI	Mild	%	Moderate	%	severe	%	very severe	%	Total	%
Underweight Less than 18.5	3	3.8	1	1.5	0	0.0	0	0	4	3
Normal weight 18.5 – 24.9	50	63.3	45	69.3	4	57.2	0	0	99	65
Overweight 25-29.9	24	30.4	16	24.6	3	42.8	0	0	43	28
Obese 30 and above	2	2.5	3	4.6	0	0.0	2	100	7	4
Total	79	100	65	100	7	100	2	100	153	100

Table (5): Distribution of study cases according to family history in relation to severity of acne.

Severity / Family History	Mild	%	Moderate	%	Severe	%	Very Severe	%	Total	%
YES	18	27.7	38	58.5	5	71.4	2	100	63	41.1
NO	61	72.3	27	41.5	2	28.6	0	0.0	90	58.9
Total	79	100	65	100	7	100	2	100	153	100

Table (6): Comparison of acne severity regarding smoking in male student.

Severity / Smoking	Mild	%	moderate	%	Severe	%	Very severe	%	Total	%
Smoker male	5	17.8	8	29.6	0	0	1	50	14	24.1
Nonsmoker male	23	82.2	19	70.4	1	100	1	50	44	75.9
Total	28	100	27	100	1	100	2	100	58	100

Discussion:

To the best of our knowledge, to date, this was the first cross-sectional study done in our country investigated the frequency of acne vulgaris in university students and specifically medical students and their association with body mass index in which no previous documentation study, or data about this essential view to this subject .

Additional, the design of this study was unique in that it focused on under-studied patient population a subpopulation of acne sufferers (medical students) that has not been studied extensively, allowing for clinical characteristics and burden of acne to be evaluated more critically.

This study was only an initial step to shed a light in describing acne and recognizing certain features in this group of patients.

Acne vulgaris is a multifactorial disease and its pathophysiology centers on the interplay of follicular hyperkeratinization, colonization with Propionibacterium acnes, increased sebum production, and inflammation. Androgens have long been recognized to stimulate sebaceous glands for the production of sebum, while hyperandrogenism is closely associated with acne formation [(3)].

The current study revealed that the overall prevalence of acne vulgaris in our cross sectional study in Tikrit Medical College students reached (46%). The data from Portuguese medical students was (62.2%) [(15)]. Greatest frequency of acne between the ages of 15 and 18 in both sexes, generally involution of the disease occurs before age 25 [(2)].

In current study the prevalence of acne in female (62%) (95/153) higher than in male (38%) (58/153) female to male ratio was 1.6:1, mostly due to earlier onset of puberty in female and this is also due in part to the nature of chronicity of acne in female. This result goes with data from Portuguese of medical students in which prevalence of acne in female was (68%) [(15)], and agree with Ahmed Abdul-Aziz et al. study [(16)].

The frequency of acne decreased significantly as the age increased in this study, because we are moving away from puberty, transient rises of insulin and IGF-1 occurring during the normal course of puberty inhibit FoxO1 regulation and allow the activated androgen receptor to trigger a chain of metabolic events, which lead to an excess production of keratinocytes and sebum [(17)]. While the occurrence of acne vulgaris in males and females is initiated by the onset of puberty, it is most likely prolonged into late adolescence by transient increases in insulin and IGF-1 levels. As the incidence of acne vulgaris peaks at the age 15 for both sexes, we begin to see a decline in late adolescence consistent with average age of puberty completion (15–17 years for females and 16–17 years for males) [(18)].

It should be noted that acne prevalence continues to persist until the third decade of life, due to a slower decline of insulin and IGF-1 levels peaking during late puberty and gradually declining [(17, 19)]. This result agree with a study of Chinese adolescents and adults which show that the highest prevalence was found in the 19 year old group (46.8%) and then declined with age [(20)].

Our work also showed percent of acne severity cases as follows (52%) (79/153) were mild, (42%) (65/153) were moderate, (5%) (7/153) were severe and (1%) (2/153) were very severe. This result agree with a study for Jeddah

Medical student which concluded that (70.2%) of cases had mild acne, (23.8%) had moderate acne and (4%) had severe acne [21].

Also agree with a community based study in Chines which concluded that (68.4%) of cases had mild acne, (26%) had moderate acne and (5.6%) had severe acne [20].

In current study the highest frequency of acne vulgaris was within normal weight this result agree with Ahmed Abdul-Aziz et al study [16].

In current study there was no association between gender and acne severity, we believed that medical students in general alert to his or her medical condition in general and in specific to the cosmetic appearance and asking for treatment early. This result agrees with a cross sectional, community based study which concludes that gender was not associated with acne severity [22].

Our study also showed the highly significant relation between acne severity and BMI, this result does go with the study in Adana, Turkey which concluded that BMI play a key role in the severity of acne [23], a case control study in Chinese Han population which concluded obese and overweight could a risk factor of acne [24]. But disagree with Ahmed Abdul-Aziz et al study in Tikrit Teaching Hospital which show no relation between acne and BMI [16], and a cross sectional study in dermatologic clinic of Razi-Hospital, Tehran, Iran which showed no statistically significant difference in BMI among people with different severities of acne [25]. Our explanation to this wide range of results regarding relation between BMI and severity of acne due in part to the number of cases and in other part to eating habits which differ in different countries, any way this point remain controversy and we advise for more data collection to reach a more statistical evaluation.

The genetic component of acne vulgaris has been described in twin studies, with some studies citing late adolescent acne patients having at least one first-degree relative with this condition [26]. Human leukocyte antigen genes, cytochrome p450 genes, and even certain glycoproteins have been implicated in the genetic predisposition to acne vulgaris [27]. Due to the complexity of the pathogenesis of acne, there are likely many heritable factors contributing to the development of acne.

Current study showed highly significant relation between family history and severity of acne, this result agree with a case control study in dermatologic outpatient clinics in Italy which concluded that family history may influence the risk of moderate to severe acne [28], and a cross sectional study in a high school community of TirguMures which concluded that family history could be considered a risk factor in acne vulgaris [29].

There are few available conflicting data on a possible correlation between acne and smoking. It is commonly accepted that smoking provokes important alterations on the skin microcirculation, on keratinocytes and on the collagen and elastin synthesis. Nicotinic receptors are expressed on keratinocytes, fibroblasts and blood vessels. Nicotine induces vasoconstriction associated with local hyperaemia. It inhibits inflammation through effects on central and peripheral nervous system and through direct effect on immune cells. It delays wound healing and accelerates skin aging [30]. This could contribute to define the "smoker's face" described by several authors [31]. Another important role,

while less investigated, could be played by the relative deficiency in antioxidants caused by smoking, which could lead to alterations in sebum composition, as described by Pelle et al. who demonstrated that peroxidation is induced in human skin by cigarette smoke and subsequently inhibited by the presence of antioxidants [(32)].

As in our study most of them were females so we excluded females to reach more accurate results, there was no relation between smoking and acne severity. Our study fail to show or reveal a protective effect for smoking, although a recent study [(33)] found tobacco-smoking was protective against acne. In fact our possible explanation to this findings that our cases may not have revealed the proper history of smoking for fear of scrutiny by faculty ,of course whatever the relation, tobacco- smoking not be promoted as an acne therapybecause of it's associated risk. Our result agree with a across sectional study in the Dermatologic Clinic of Razi Hospital, Tehran, Iran which concluded that smoking do not seem to aggravate the acne severity [(25)]. On the other side disagree with a cross sectional study in a high school community of Tirgu, Mures which concluded that smoking could be considered as a risk factor in acne vulgaris [(29)], the differences between the study findings is probably due to methodological issues such as difference in study population, definition of smoking and/ or acne, and sample size, and to a lesser extent to true population differences.

References:

[1]. Layton AM. Disorders of the sebaceous glands. In: Rook's Text Book of Dermatology, Burns T, Breathnach S, Cox N, Griffiths G. 8th ed. Blackwell Scientific Publication, 2010; 2:42:1-82.

[2]. James WD, Berger TG, and Elston DM. Acne In: Andrews's Disease of the Skin, Clinical Dermatology, 12thed. WB Sounder Company Philadelphia 2016, 13: 225-244.

[3]. Herane MI, Ando I. Acne in infancy and acne genetics. Dermatology 2003, 206:24-28.

[4]. Dreno B, Poli F. Epidemiology of Acne. Dermatology. 2003; 206: 7–10.

[5]. Habif TP. Acne and related disorder. In Clinical Dermatology: A Color Guide to Diagnosis and Therapy, 5th ed. Edinburgh, UK, *Mosby*, 2010; 7: 217-247.

[6]. Obesity and overweight. WHO. January 2015. Retrieved 2 February 2016.

[7]. BMI classification". World Health Organization. Retrieved 15 February 2014.

[8] .Mean body mass index : http://www.who.int/gho/ncd/ riskfactor/bmi.text/ en

[9]. Cupisti S, Dittrich R, Binder H, et al. Influence of body mass index on measured and calculated androgen parameters in adult women with hirsutism and PCOS. ExpClinEndocrinol Diabetes 2007; 115:380-6.

[10]. Huppert J, Chiodi M, Hillard PJ. Clinical and metabolic findings in adolescent females with hyperandrogenism. J PediatrAdolescGynecol 2004;17:103-8.

[11]. Yosipowitch G, DeVore A, Dawn A. Obesity and the skin: skin physiology and skin manifestations of obesity. J Am AcadDermatol 2007;56:901-16.

[12]. Samojlik E, Kirschner MA, Silber D, et al. Elevated production and metabolic clearance rates of androgens in morbidly obese women. J ClinEndocrinolMetab 1984؛ 59: 949-54.

[13]. Pasquali R, Casimirri F. The impact of obesity on hyperandrogenism and polycystic ovary syndrome in premenopausal women. ClinEndocrinol (Oxf) 1993; 39: 1-16.

[14]. Doshi A, Zaheer A, Stiller MJ . A comparison of current acne grading systems and proposal of a novel system . Int J dermatol 1997 ; 36: 416-8

[15]. Goncalves.G, Amado.J.M, Matos.M.E, Massa.A.The prevalence of acne among a group of Portuguese medical

students. Journal of the European Academy of Dermatology and Venereology. 2012; 26:514-517
[16]. Ahmed Abdul-Aziz A, MazinHamed, Mohammad S.Nayaf , Zena Ali H. Impact of body mass index of acne ; A clinical observational study . 1 st Scientific conference of medical group college. 2013, 7-11.
[17]. Caprio S, Plewe G, Diamond MP, et al. Increased insulin secretion in puberty: a compensatory response to reductions in insulin sensitivity. *J Pediatr*. 1989; 114(6):963–967.
[18]. 8/1 M. Parents and Teachers: Teen Growth and Development, Years 15 to 17; 2015. Available from: http://www.pamf.org/parenting-teens/health/growthdevelopment /growth.html. Accessed May 29, 2015.
[19]. Plant TM. Neuroendocrine control of the onset of puberty. *Front Neuroendocrinol*. 2015; 38:73–88.
[20]. Shen Y, Wang T, Zhou C et al. prevalence of acne vulgaris in Chinese Adolescents and Adults : acomunity based study of 17.345 subjects in six cities . ActaDermVenereol. 2012; 92: 40-44.
[21]. Shadi Zari, AsraaTurkistani. Acne vulgaris in Jeddah Medical Students: prevalence, severity, self-report and treatment practices. Journal of Cosmetics, Dermatological Sciences and Applications. 2017; 7: 67 -76.
[22]. Zahra Godsi S, Helmut Orawa, ChrisotsC. Zouboulis. Prevalence , severity , And severity riskfactors of acne in High school Pupils : A community based study . Journal of Investigative Dermatology. 2009; 129: 2136-2141
[23]. SevilAlaan MD, ErolCenesizoglu MD. Effects of hyperandrogenism and high body mass index on acne severity in woman. Saudi Med J. 2014; 35 (8):886 - 889.
[24]. LY LU , HY Lai , ZY Pan , ZX Wu , WC Chen , Q Ju .Obese / overweight and the risk of acne vulgaris in Chinese adolescents and young adults . Hong Kong J .Dermatol . Venereol. 2017; 25:5-12
[25]. Vahideh Lajevardi, MD, Seyede Zahra Ghodsi, MD, Maryam Daneshpazhooh, MD. The relationship between body mass index and the severity of acne. Iranian Journal of Dermatology. 2014;17:13-16.
[26]. Bataille V, Snieder H, MacGregor AJ, Sasieni P, Spector TD. The influence of genetics and environmental factors in the pathogenesis of acne: a twin study of acne in women. *J Invest Dermatol*. 2002; 119(6): 1317–1322.
[27]. Ando I, Kukita A, Soma G, Hino H. A large number of tandem repeats in the polymorphic epithelial mucin gene is associated with severe acne. *J Dermatol*. 1998; 25(3):150–152.
[28]. Anna Di Landro,MD,SimoneCazzaniga,PhD Math et al. Family history ,body mass index, selected dietary factors, menstrual history ,and risk of moderate to severe acne in adolescent and young adults. J Am Acad Dermatol.2012; 67:1129-35.
[29]. Al Hussein Stela , Al Hussein Hussam, VariCamil Eugen et al .Diet, smoking and Family history as potential risk factors in acne vulgaris –a community –based study. ActaMedica Marisiensis.2016; 62:173-181.
[30]. Misery L. Nicotine effects on the skin: are they positive or negative? ExpDermatol 2004; 13:665-70.
[31]. Ko JS Kang H, Woo Choi S, Kim HO. Cigarette smoking associated with premature facial wrinkling: image analysis of facial skin replicas. Int J Derm 2002; 41:21-7.
[32]. Pelle E, Miranda EP, Fthenakis C, Mammone T, Marenus K, Maes D. Cigarette smoke induced lipid peroxidation in human skin and its inhibition by topically applied antioxidants. Skin PharmacolAppl Skin Physiol 2002; 15:63-8.
[33]. Rombouts S, Nijsten T, Lambert J. Cigarette smoking and acne in adolescents: results from a cross-sectional study. Journal of the European Academy of Dermatology and Venereology. 2007; 21:326-333.