Original Research Paper

Volume - 11 | Issue - 09 | September - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Dermatology

A CLINICO-EPIDEMIOLOGICAL STUDY OF ACNE VULGARIS IN RURAL CENTRAL INDIA

Dr. Preeti*	Consultant, HOD Dermatology, Aadhar Hospital, Hisar. *Corresponding Author
Dr. Mohar	MD Anaesthesia, Aadhar Hospital, Hisar.
Dr. Neeraj Nagar	MD Anaesthesia, Aadhar Hospital, Hisar.
Dr. Parnit Bhusal	MD Anaesthesia, Aadhar Hospital, Hisar.

ABSTRACT **Background:** Acne vulgaris is a common skin condition which mainly affects over three-quarters of adolescents at some time during or following their puberty. There are few Indian studies on the profile of acne vulgaris.

Aim: To study the epidemiology of acne vulgaris in rural central India and its relationship with smoking and seborrheic capitis and menstrual cycle and androgenetic markers in females and its seasonal variation.

Methods: The study was conducted between November 2012 and October 2014. All patients with acne vulgaris who consented to participate in the study were included. The parameters which were evaluated, included age, gender, age of onset, duration of lesions, site of lesions, grade, post-acne scarring, post-acne hyperpigmentation, seasonal variation, history of smoking, clinical markers of androgenicity in females, clinical evidence of seborrheic capitis.

Results: A total of 210 patients with acne vulgaris were included in the study. Male to female ratio was 1.02:1 with mean age of 17.28 years. The most common age groups were 16-20 years and 21-25 years. Face was the most common site involved followed by the back, arms, chest and neck. The most common type of lesion in this study was comedone. A total of 49 patients had grade 1 acne vulgaris and 126 had grade 2 acne. Grade 3 acne vulgaris was diagnosed in 29 patients and grade 4 in 6 patients.

It was also found that male patients had more severe acne vulgaris. Post-acne scarring was seen in 97 patients. Patients with longer duration of the disease are more likely to have post-acne scarring which was significant. Post inflammatory hyperpigmentation (PIH) was observed in 149 patients.49 female patients had a history of premenstrual flare of acne. Nine patients had some marker of androgenicity. There was no association between severity of acne vulgaris and the markers of androgenicity. Seborrheic capitis was the most common disease associated with acne vulgaris. Seasonal variation was observed in 56 patients. Smoking had no relation to severity of acne.

Conclusion: This study introduced with the prevalence of acne vulgaris in a tertiary care hospital of rural central india.

KEYWORDS : Acne vulgaris, Comedones, Post-acne scarring, Post-acne pigmentation, smoking, Seborrheic capitis.

INTRODUCTION

Acne is a chronic inflammatory disease. This is one of the most common skin disease affecting all age groups and races.[1] Having a long history, it is known as one of the world's most common skin disorder. Acne vulgaris is a common skin condition which mainly affects over three-quarters of adolescents at some time during or following their puberty. It usually affects about 75–80% of adolescents with an associated impact on their quality of life.[2] Frequency of acne varies worldwide, according to age and gender.[3] Although acne is considered as a disorder of adolescence, the prevalence of adult patients with acne is also increasing.[4] It has been found that, acne develops earlier in females than in males, which may be due to the earlier onset of puberty.[5] It has been also reported that the most severe forms of acne vulgaris occur more commonly in males, but the lesions tends to be more persistent in females.[6]

Its pathogenesis includes follicular hyperkeratinization, Seborrhoea, follicular colonization by Propionibacterium acnes, immune and inflammatory responses. Acne is a polymorphic, inflammatory disease of the skin which usually occurs on the face and to some extent on the chest and back.

The precursor lesion is a microcomedo which further forms an open or closed comedone and this may progress into papule, pustule or nodule. Post acne scarring and hyperpigmentation are the usual complication of acne. Severity of the disease varies markedly from one individual to the other depending upon various factors involved in the development of acne vulgaris.

Acne is not a minor disease as the physical, social, and psychologic morbidity related to this can be serious. Its psychologic impact may be considerable, leading to worsening of the quality of life but effective medical treatments are available for acne which can improve psychological health and quality of life.

As there are few epidemiological datas on the prevalence of acne in india, the objective of this study was to estimate the prevalence and degree of acne , its seasonal variation , relation with smoking and its association with the androgenetic markers in female in the rural central india pouplation.

METHODS

This study was conducted between November 2012 and October 2014, after taking approval by the Ethical committee of Institute. All patients with acne vulgaris attending the outpatient department of dermatology in a tertiary care hospital of rural central india , who consented to participate in the study were included. Patients with drug-induced and other acneiform eruptions were excluded from study. A detailed history and examination was carried out for each patient, including a medical and family history. The variables which were assessed , included age and gender of patient, age of onset of and duration of acne, body sites involved, grade of acne, post-acne scarring and hyperpigmentation, relation to menstrual cycle, markers of androgenicityin females, seasonal variation , history of smoking and clinical evidence of seborrheic capitis. Severity of acne vulgaris was graded using a simple grading system by Indian authors[7], taking into account the predominant lesion to grade acne, which classifies acne vulgaris into four grades.

Grade 1: Comedones, occasional papules.
Grade 2: Papules, comedones, few pustules.
Grade 3: Predominant pustules, nodules, abscesses.
Grade 4: Mainly cysts, abscesses, widespread scarring.
Clinical markers of Androgenicity which were evaluated in females were:
· Hirsutism
· Acanthosis nigricans
· Androgenetic alopecia

Data entry was done in Excel software and Statistical analysis was done by using descriptive and inferential statistics using chi square test and Z test for difference between two means. The soft ware used in analysis were SPSS17.0 Version and Graphpad Prism 5.0 and $p<0.05$ was considered as level of significance.

RESULTS

A total of 210 patients with acne vulgaris were included in the study. Out of these, 104 (49.52%) were females and 106 (50.48%) were males. Male to female ratio was 1.02:1. These all patients had age varying from 11 to 40 years with the mean of 19.59 years (SD ± 4.15). The most common age groups to be involved in acne vulgaris were 16-

20 years (120 cases, 57.14%) and 21-25 years (56 cases, 26.67 %).**Table 1** is showing the distribution of patients according to the age of presentation.

Table 1: Distribution Of Patients According To Age Of Presentation

Age Group (years)	No of patients	Male(%)	Female(%)
10-15 years	21(10%)	10(4.76%)	11(5.24%)
16-20 years	120(57.14%)	69(32.86%)	51(24.29%)
21-25 years	56(26.67%)	22(10.48%)	34(16.19%)
26-30 years	8(3.81%)	4(1.90%)	4(1.90%)
>30 years	5(2.38%)	1(0.48%)	4(1.90%)
Total	210(100%)	106(50.48%)	104(49.52%)
Mean ± SD	19.59 ± 4.15	19.15±3.59	20.04±4.63
Range	11-40 years	11-32 years	11-40 years
ϰ2-value	7.10		
p-value	0.13,NS,p>0.05		

NS: Non significant

Mean age of onset of patients in this study was 17.28 years (SD ± 3.50) with range, 11-40 years. The mean age of onset in male patients (17.14 ± 3.16 years) was nearly same as of female patients (17.43 ± 3.83) and the p value was 0.54, >0.05.

Mean duration of acne vulgaris was 28.62 ± 29.45 months and the range was 1-192 months.

Face was involved in 209 (99.52%) patients. However, face alone was involved in 131(62.4%) patients. This was followed by the involvement of the back in 65 (30.95%), arms in 29 (13.81%), chest in 26 (12.38%) and neck in 6 (2.86%) patients. **Table 2** is showing the distribution of the patients according to the site of acne.

Table 2: Distribution Of Patients According To The Site Of Acne

Site	Male	Female	Total	%	ϰ2-value	p-value
Face	105	104	209	99.52	0.98	0.32 NS,p>0.05
Forehead	102	91	193	91.90	5.37	0.020 S,p<0.05
Cheek	105	104	209	99.52	0.98	0.32 NS,p>0.05
Chin	69	60	129	61.43	1.21	0.27 NS,p>0.05
Nose	68	56	124	59.05	2.30	0.12 NS,p>0.05
Neck	2	4	6	2.86	0.72	0.39 NS,p>0.05
Back	40	25	65	30.95	4.60	0.032 S,p<0.05
Chest	14	12	26	12.38	0.13	0.71 NS,p>0.05
Arms	17	12	29	13.81	0.89	0.34 NS,p>0.05

S: Significant

The most common type of lesion in this study was comedone, in 201 (95.71%) patients followed by papules in 184 (87.62%) patients, pustules in 50 (23.81%) patients and nodules in 16 (7.62%) patients and cysts in 7 (3.33%) patients.

A total of 49 patients (23.33%) had grade 1 acne vulgaris and 126 (60%) had grade 2 acne. Grade 3 acne vulgaris was diagnosed in 29 patients (13.81%) and grade 4 acne vulgaris in 6 patients (2.86%).

It was also found that male patients had more severe acne vulgaris, p =0.048,<0.05, (23 males vs. 12 females had grade 3 and more than grade 3 acne vulgaris). **Table 3** is showing the distribution of different grades of acne among patients. **Table 4** shows severity of acne with respect to gender.

Table 3: Distribution Of Different Grades Of Acne

Grading of acne	No of patients	Male(%)	Female(%)
Grade 1	49(23.33%)	19(9.05%)	30(14.29%)
Grade 2	126(60%)	64(30.48%)	62(29.52%)
Grade 3	29(13.81%)	19(9.05%)	10(4.76%)
Grade 4	6(2.86%)	4(1.90%)	2(0.95%)
Total	210(100%)	106(50.48%)	104(49.52%)
ϰ2-value	5.94		

Table 4: Correlation Of Severity Of Acne With Gender

Gender	Grade 1 + Grade 2	Grade 3+ Grade 4	ϰ2-value	p-value
Male	83(39.52%)	23(10.95%)	3.90	0.048 S, p<0.05
Female	92(43.81%)	12(5.71%)		
Total	175(83.33%)	35(16.67%)		

It was found that patients aged 20 years or older had more severe acne when compared to the grade in patients of age less than 20 years but it was not significant (p = 0.32, >0.05). Patients with longer duration of the disease had more severe acne but it was not significant (P =0.54,>0.05).

Post-acne scarring was seen in 97 patients (46.19%). Patients with longer duration of the disease are more likely to have post-acne scarring which was significant (69.57 % in duration >2 years vs. 34.75% in duration <2 years; P < 0.05). Males suffered more from scarring as compared to females but it was not significant. **Table 5** is showing correlation of duration with scarring.

Table 5: Correlation Of Duration With Scarring

Duration(month)	Present	Absent	ϰ2-value	p-value
Upto 24 months	49(23.33%)	92(43.81%)	22.59	0.000 S, p<0.05
>24 months	48(22.86%)	21(10%)		
Total	97(46.19%)	113(53.81%)		

Post inflammatory hyperpigmentation (PIH) was observed in 149 patients (70.95%).

Three female patients (2.88%) had not attained menarche and 7 female patients (6.73%) gave a history of irregular menstrual periods. While 49 female patients (47.12%) had a history of premenstrual flare of acne.

Nine female patients (8.65%) had some marker of androgenicity. The most common marker of androgenicity observed was hirsutism (77.78%). There was no association between severity of acne vulgaris and the markers of androgenicity (p = 0.96, > 0.05).**Table 6** is showing the markers of androgenicity in female patients. **Table 7** is showing the correlation of markers of androgenicity and severity of acne in females.

Table 6: Markers Of Androgenicity In Female Patients

Markers of androgenicity	No of patients	Percentage
Acanthosis nigricans	1	11.11
Hirsutism	6	66.67
Female androgenetic alopecia	1	11.11
Acanthosis nigricans + Hirsutism	1	11.11

Table 7: Correlation Of Markers Of And Rogenicity And Severity Of Acne In Females

		Grade of Acne		Total
		Grade 1+2	Grade 3+4	
Markers	Absent	84(80.77%)	11(10.58%)	95(91.35%)
	Present	8(7.69%)	1(0.96%)	9(8.65%)
Total		92(88.46%)	12(11.54%)	104(100%)
ϰ2-value		0.002		
p-value		0.96,NS,p>0.05		

Seborrheic capitis was the most common disease associated with acne vulgaris and was present in 65 patients (30.95%).

Seasonal variation was observed in 56 patients (26.67%); acne in 38 patients (18.1%) exacerbated in summer and in 9 patients (4.3%) in winter and 9 patients (4.3%) in rainy season. In 43 (20.5%) patients, duration of disease was less than 12 months; hence, seasonal variation could not be determined. **Table 8** is showing the seasonal exacerbation of acne in patients.

Table 8: Distribution According To The Seasonal Exacerbation Of Acne

Season	No of patients	Percentage
Summer	38	18.1

Winter	9	4.3
Rainy	9	4.3
Total	56	26.67

Only 5 patients (2.38%) were smokers. In our study, smoking had no relation to severity of acne (Among smokers none had grade 3 or grade 4 acne vs. 17.07% non-smokers had grade 3 or grade 4 acne vulgaris; p=0.31, >0.05).

DISCUSSION

Acne vulgaris is a common skin condition in adolescents. The prevalence of acne is found to vary between ethnic groups and countries. Various epidemiological studies on acne vulgaris have been done worldwide and in India few studies have been done. This was a cross-sectional study and was conducted between November 2012 to October 2014 and total 210 patients were included.

Different studies have shown different findings in relation to the sex predominance. In the present study, the proportion of male and female patients was nearly equal. In earlier studies, Adityan et al[6], Yeung et al[8], found more male patients than female while Kane et al[2], Tan et al[9], Kilkenny et al[10], Ismail et al[11] and Al-Ameer et al[12] found female patients in higher proportion than male. The predominance of females may be attributed to their higher level of awareness and concern in view of cosmetic improvement as compare to males.

The mean age of presentation in the present study was 19.15 ± 3.59 years for male and 20.04 ± 4.63 years for female which was equivalent to the findings of earlier studies. Kane et al[2] noted that the mean age of presentation of their patients was 25.58 years. Ismail et al[11] found the mean age of presentation of males and females as 18.62 ±3.19 and 20.83 ± 4.49 years, respectively. Al-Ameer et al[12] observed that the age at presentation was 19.2 ± 3.0 years for males and 18.4 ± 4.2 years for females.

It is thought that acne vulgaris develops earlier in females than in males.[12,13] The earlier onset of acne in females may be related to their earlier puberty. However, in present study, the mean age of onset in males and females was 17.14 ± 3.16 years and 17.43 ± 3.83 years respectively, which was not significant.

Acne vulgaris occurs at the sites of body which are rich in pilosebaceous units. It was found in the present study that face was the most common site of acne in 99.52% patients, back in 30.95%, arms in 13.81%, chest in 12.38% and neck in 2.86% patients. Adityan et al[6] and Bagatin et al[14] also found face as the main site of lesions. Acne vulgaris is a polymorphic disease. Comedone is thought to be the primary lesion of acne vulgaris. In the present study comedone was the most common lesion. Adityan et al[6], Bagatin et al[14] and Kilkenny et al[15] also had finding of comedone as the most common lesion.

In the present study, grading for severity of acne vulgaris was done by using a simple system of classification by Indian authors, with a four-grade system[7] and grade 2 (predominantly papular) acne vulgaris was the most common grade. While in the earlier studies by Kane et al[2], Adityan et al[6] and Shen et al[13], patients with grade 1 (predominantly comedonal) acne vulgaris outnumbered patients with more severe inflammatory forms.

In the present study there was no relation between the older age group and the severity of acne vulgaris. While in earlier studies by Adityan et al[6] and Kilkenny et al[15], it was found that severe acne occurred commonly in patients of older age group.

In the present study, patients with longer duration of the disease had no effect on severity of acne vulgaris. Adityan et al[6],Borgia et al[16] and Poli et al[17] found that patients with longer duration of the disease had more severe acne vulgaris. Another finding in the present study was that male patients had more severe acne vulgaris which was in accordance to the findings of earlier studies.[6,15]

In the present study, post-acne scarring was seen in 46.19% patients. While Kane et al[2] noticed post acne scarring in 40.2%, Adityan et al[6] found in 39.5% patients, Kilkenny et al[15] reported in 25% and Taylor et al[18] noted in 5.9% patients.

In the present study it was also observed that patients with longer duration of the disease were more likely to have post-acne scarring. This was also reported in earlier studies.[6,19] Post-acne hyperpigmentation was observed in 70.95% patients in the present study. While Kane et al[2] noted post - acne hyperpigmentation in 67.7%, Adityan et al[6] in 24.6%, Yeung et al[8] in 52.6% and Taylor et al[18] in 52.6% patients.

Premenstrual flare was noticed in 47.12% female patients in the present study. Adityan et al[6] found premenstrual flare in 57.7% female patients, Stoll et al[20] in 44% of female patients, Lucky et al[21] in 63% of adult female patients, Tan et al[9] in 39%, Ghodsi et al in[22] 35.5% and Addor et al[23] in 46.5% female patients. Different mechanisms have been considered for this premenstrual flare of acne which includes, changes of surface lipid composition during the premenstrual phase, changes in hydration or the molecular structure of keratins or vasoactive effect of prostaglandin but the exact hormonal cause for this flare is still to be elucidated.[22]

In the present study, hirsutism was observed in 6.73% female patients and acanthosis nigricans in 1.93% and female androgenetic alopecia in 0.96% and no correlation was found between these clinical markers of androgenicity and severity of acne vulgaris. Irregular menstrual cycles were found in 6.73% female patients and there was no association between the irregular menses and acne severity. Similarly Adityan et al[6] found hirsutism and irregular menses in 9.48% and 10.2% respectively and acanthosis nigricans in 6.57% and female androgenetic alopecia in 1.46% and there was no correlation between acne severity and these clinical markers of androgenicity. Borgia et al[16] found hirsutism in 19.38% females and irregular menstrual cycles in 15.5% and there was no significant association between hirsutism and severity of acne vulgaris. Cibula et al[24] observed hirsutism in 21% patients and irregular menses in 48% and no association was found between irregular menses and acne severity and significant negative correlations were demonstrated between acne severity and hirsutism score.

Both acne vulgaris and seborrheic dermatitis occur over the seborrheic areas of the body and seborrhoea plays an important role in the pathogenesis of these two diseases. In the present study, seborrheic capitis was the most common disease associated with acne vulgaris and was present in 30.95% patients. Similarly Adityan et al[6] observed seborrheic dermatitis as the most common disease associated with acne vulgaris in 21.35% patients and in other study, by Peyrí et al[25], involving patients with seborrheic dermatitis, acne vulgaris was the most common concomitant disease seen in 35%.

The association of smoking and acne vulgaris is controversial. In the present study, there was no relationship between smoking and severity of acne vulgaris. Similarly Adityan et al[6], Bagatin et al[14] and Ghodsi et al[22] also did not find any association between acne severity and smoking. Firooz et al[26] also could not find any association between acne and smoking in their study. On the other hand, Schäfer et al[27] observed in their study that smoking increases the risk for acne and also the number of cigarettes smoked was related to the severity of acne and according to Chuh et al[28], smoking is likely to bear a positive correlation with acne. Capitanio et al[29] also detected post-adolescent acne frequent among smokers. While Klaz et al[30] found an inverse, dose dependent association between severe acne prevalence and daily cigarette consumption. In case of smokers, impairment of vasoreactivity, collagen synthesis and wound healing, relative ascorbic acid deficiency may play some role in the pathogenesis for the association between smoking and acne.

According to the conventional dermatological opinion, acne improves in summer and aggravates in winter. While in present study, seasonal variation was observed in 26.67% patients; of which 18.1% exacerbated in summer, 4.3% in winter and 4.3% in rainy season. Earlier studies have shown different results regarding seasonal variation in acne vulgaris. Khunger et al[31] found 36.4% patients showing aggravation of acne in summer, 5% in rainy and 1.4% in winter season. Adityan et al[6] observed acne exacerbation in summer up to 23 % and in 2.9% in winter. On the other hand, Al-Ameer et al[12] found that acne exacerbates in winter, and often improves during the summer months. Sardana et al[32] also found worsening of acne vulgaris during summer. Increased temperature, marked humidity, and sweating may explain the aggravation of acne vulgaris in summer and rainy season.

To conclude, our study included 210 patients with acne vulgaris, with the male to female ratio of 1.02:1 with mean age of 17.28 years and most common age groups of 16-20 years (57.14%) and 21-25 years

(26.67 %). Face was the most common site involved in 209 (99.52%) patients. Comedone was the most common type of lesion, in 201 (95.71%) patients. A total of 49 patients (23.33%) had grade 1 acne vulgaris and 126 (60%) had grade 2 , 29 patients (13.81%) had grade 3 while 6 patients (2.86%) had grade 4 acne. Post-acne scarring and hyperpimentation were seen in 97 patients (46.19%) and 149 patients (70.95%) respectively. Nine patients (8.65%) had some marker of androgenicity. The most common marker of androgenicity observed was hirsutism (77.78%). Seborrheic capitis was the most common disease associated with acne vulgaris and was present in 65 patients (30.95%). Seasonal variation was observed in 56 patients (26.67%); acne in 38 patients (18.1%) exacerbated in summer and in 9 patients (4.3%) in winter and 9 patients (4.3%) in rainy season. Smoking had no relation to severity of acne.

CONCLUSION:

This study introduces the prevalence of acne vulgaris in rural central India population.

REFERENCES

1. Davis EC, Callender VD. A Review of acne in ethnic skin: pathogenesis, clinical manifestations, and management strategies. J Clin Aesthetic Dermatol. 2010;3:24-38.
2. Kane A, Niang SO, Diagne AC, Ly F, Ndiaye B. Epidemiologic, clinical, and therapeutic features of acne in Dakar, Senegal. Int J Dermatol. 2007;46:36-8.
3. Bagatin E, Timpano DL, Guadanhim LR, Nogueira VM, Terzian LR, Steiner D, Florez M. Acne vulgaris: prevalence and clinical forms in adolescents from São Paulo, Brazil. An Bras Dermatol. 2014 May-Jun;89(3):428-35.
4. Goulden V, Clark S, Cunliffe W. Post-adolescent acne: A review of clinical features. Br J Dermatol 1997;136:66-70.
5. Layton AM. Disorders of the Sebaceous Glands. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. Rook's Textbook of Dermatology, 8th ed. Oxford: Willey-Blackwell Publishers; 2010. p. 42.1-89.
6. Adityan B, Thappa DM. Profile of acne vulgaris--a hospital-based study from South India. Indian J Dermatol Venereol Leprol. 2009;75:272-8.
7. Adityan B, Kumari R, Thappa DM. Scoring systems in acne vulgaris. Indian J Dermatol Venereol Leprol. 2009;75:323-6.
8. Yeung CK, Teo LH, Xiang LH, Chan HH. A community-based epidemiological study of acne vulgaris in Hong Kong adolescents. Acta Derm Venereol. 2002;82:104-7.
9. Tan HH, Tan AW, Barkham T, Yan XY, Zhu M. Community-based study of acne vulgaris in adolescents in Singapore. Br J Dermatol. 2007;157:547-51.
10. Kilkenny M, Stathakis V, Hibbert ME, Patton G, Caust J, Bowes G. Acne in Victorian adolescents: associations with age, gender, puberty and psychiatric symptoms. J Paediatr Child Health. 1997;33:430-3.
11. Ismail KH, Mohammed-Ali KB. Quality of life in patients with acne in Erbil city. Health Qual Life Outcomes. 2012;10:60.
12. Al-Ameer AM, Al-Akloby OM. Demographic features and seasonal variations in patients with acne vulgaris in Saudi Arabia: a hospital-based study. Int J Dermatol. 2002;41:870-1.
13. Shen Y, Wang T, Zhou C, Wang X, Ding X, Tian S, et al. Prevalence of acne vulgaris in Chinese adolescents and adults: a community-based study of 17,345 subjects in six cities. Acta Derm Venereol. 2012;92:40-4.
14. Bagatin E, Timpano DL, Guadanhim LR, Nogueira VM, Terzian LR, Steiner D, et al. Acne vulgaris: prevalence and clinical forms in adolescents from São Paulo, Brazil. An Bras Dermatol. 2014;89:428-35.
15. Kilkenny M, Merlin K, Plunkett A, Marks R. The prevalence of common skin conditions in Australian school students: 3. acne vulgaris. Br J Dermatol. 1998;139:840-5.
16. Borgia F, Cannavò S, Guarneri F, Cannavò SP, Vaccaro M, Guarneri B. Correlation between endocrinological parameters and acne severity in adult women. Acta Derm Venereol. 2004;84:201-4.
17. Poli F, Auffret N, Beylot C, Chivot M, Faure M, Moyse D, et al. Acne as seen by adolescents: results of questionnaire study in 852 French individuals. Acta Derm Venereol. 2011;91:531-6.
18. Taylor SC, Cook-Bolden F, Rahman Z, Strachan D. Acne vulgaris in skin of color. J Am Acad Dermatol. 2002;46:S98-106.
19. Goulden V, Stables GI, Cunliffe WJ. Prevalence of facial acne in adults. J Am Acad Dermatol. 1999;41:577-80.
20. Stoll S, Shalita AR, Webster GF, Kaplan R, Danesh S, Penstein A. The effect of the menstrual cycle on acne. J Am Acad Dermatol. 2001;45:957-60.
21. Lucky AW. Quantitative documentation of a premenstrual flare of facial acne in adult women. Arch Dermatol 2004;140:423-4.
22. Ghodsi SZ, Orawa H, Zouboulis CC. Prevalence, severity, and severity risk factors of acne in high school pupils: a community-based study. J Invest Dermatol. 2009;129:2136-41.
23. Addor FA, Schalka S. Acne in adult women: epidemiological, diagnostic and therapeutic aspects. An Bras Dermatol. 2010;85:789-95.
24. Cibula D, Hill M, Vohradnikova O, Kuzel D, Fanta M, Zivny J. The role of androgens in determining acne severity in adult women. Br J Dermatol. 2000;143:399-404.
25. Peyrí J, Lleonart M; Grupo español del Estudio SEBDERM. [Clinical and therapeutic profile and quality of life of patients with seborrheic dermatitis].Actas Dermosifiliogr. 2007;98:476-82.
26. Firooz A, Sarhangnejad R, Davoudi SM, Nassiri-Kashani M. Acne and smoking: is there a relationship? BMC Dermatol. 2005;5:2.27. Schäfer T, Nienhaus A, Vieluf D, Berger J, Ring J. Epidemiology of acne in the general population: the risk of smoking. Br J Dermatol. 2001;145:100-4.
28. Chuh AA, Zawar V, Wong WC, Lee A. The association of smoking and acne in men in Hong Kong and in India: a retrospective case-control study in primary care settings. Clin Exp Dermatol. 2004;29:597-9.
29. Capitanio B, Sinagra JL, Ottaviani M, Bordignon V, Amantea A, Picardo M. Acne and smoking. Dermatoendocrinol. 2009;1:129-35.
30. Klaz I, Kochba I, Shohat T, Zarka S, Brenner S. Severe acne vulgaris and tobacco smoking in young men. J Invest Dermatol. 2006;126:1749-52.
31. Khunger N, Kumar C. A clinico-epidemiological study of adult acne: is it different from adolescent acne? Indian J Dermatol Venereol Leprol. 2012;78:335-41.
32. Sardana K, Sharma RC, Sarkar R. Seasonal variation in acne vulgaris--myth or reality. J Dermatol. 2002;29:484-8.