International Journal of Research in Dermatology
Hosthota A et al. Int J Res Dermatol. 2017 Jun;3(2):196-201
http://www.ijord.com

DOI: http://dx.doi.org/10.18203/issn.2455-4529.IntJResDermatol20171468

Original Research Article

The association of acne vulgaris with smoking in men: a hospital based study

Abhineetha Hosthota[1]*, Swapna Bondade[2], Renu K.[1], Swati Braroo[2]

[1]Department of Dermatology, [2]Department of Psychiatry, The Oxford Medical College Hospital And Research Centre, Bangalore, Karnataka, India

Received: 05 March 2017
Accepted: 27 March 2017

***Correspondence:**
Dr. Abhineetha Hosthota,
E-mail: abhineethahosthota@yahoo.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Acne is a multifactorial dermatosis which occurs often during early adulthood with different grades of severity. The factors contributing to the formation of acne include genes, hormones, iatrogenic, psychological, environmental and occupation. Our article presents the findings on a possible impact of smoking on acne.
Methods: This study was conducted to evaluate smoking habits in 126 male acne patients in the age group of 15-45 years. Equal number of age and gender matched healthy controls were taken after consent. These subjects were administered a semi structured proforma to collect socio demographic details. Acne was graded taking into account the predominant lesions and smokers were administered Fagerstrom Test for Nicotine Dependence.
Results: Among the total subjects, 28.57% of cases and 15.87% of controls were smokers. In acne patients the number of cigarettes smoked was more as compared to controls. There was positive correlation between the number of cigarettes and the grading of the acne(r=0.4515). The risk of acne was 2.12 times more in smokers than in non-smokers.
Conclusions: Various studies have reported that smoking may play a role in pathogenesis of acne. Compelling evidence shows that higher nicotine dependence will exacerbate acne. So the association between the two cannot be excluded. The effect of smoking on the course of acne is still inexplicit.

Keywords: Smoking, Acne vulgaris, Nicotine, Male

INTRODUCTION

Acne vulgaris affects over 80% of all individuals during early adult life, with males more commonly affected than female subjects.[1] Several factors have been suggested to influence acne including diet, sweating, UV radiation, stress, and occupation.[2] Of late smoking is an imperative and reversible risk factor of several diseases due to change in lifestyle. The skin is an organ gets affected by cigarette smoke both directly through contact and indirectly as the toxic substances entering into the blood stream by inhalation.[3] There is paucity of literature establishing the relationship between smoking and acne. It is not clear whether smoking is a contributing or counteracting factor for acne. Due to the contentious association between acne and smoking in previous studies, we attempted to study the relation between acne and smoking in men.

METHODS

This study was conducted in the department of dermatology of The Oxford Medical College, Hospital and Research centre (T.O.M.C.H&R.C) for 6 months (June to December) in 2015 to evaluate the smoking habits in 126 male acne patients in the age group of 15-45

years. Subjects who smoke at least one cigarette per week were taken as smokers. Only male subjects were included to eliminate gender specific hormonal confounding variable. Those who had other dermatological disorders, chronic medical illness and other drugs which can alter the course of acne were excluded from the study. Equal number of age and gender matched healthy controls were taken for the study. The written informed consent was taken from the subjects and from their parents who were below 18 years. These subjects were administered a semi structured proforma to collect socio demographic details. Acne was graded taking into account the predominant lesions and smokers were administered Fagerstrom Test for Nicotine Dependence (FTND). This study was approved by the ethical committee of the institute. Results obtained were analyzed using descriptive and inferential statistical methods like Chi-square test, Odds ratio and Pearson's correlation.

Measurements

Grading of acne

Acne vulgaris was graded into four grades, taking into account the predominant lesions present;

Grade 1: Comedones, occasional papules.
Grade 2: Papules, comedones, few pustules.
Grade 3: Predominant pustules, nodules, abscesses.
Grade 4: Mainly cysts, abscesses, widespread scarring.[4]

Fagerstrom test for nicotine dependence

This was designed by Fagerstrom (1978). The scores obtained on the test, permit the classification of nicotine dependence into five levels: very low (0 to 2 points); low (3 to 4 points); moderate (5 points); high (6 to 7 points); and very high (8 to 10 points).[5] In our study for the ease of discussion; very low, low and moderate severity of dependence groups have been combined together as low; high and very high severity of dependence groups have been combined together as high.

RESULTS

Among the total subjects, 36 (28.57%), 20 (15.87%) of cases and controls were smokers respectively. In 66.6% of the smokers the age of onset of acne was in the age between 20-30 years whereas in 80% of non-smokers it was 11-20, and this difference was statistically significant. Comedones and papules were commonest lesions distributed in seborrheic areas in non-smokers however it was restricted to face in smokers mostly pustules involving mandibular and malar region. Grade 2 acne was common in non-smokers whereas grade 3 acne was common in smokers. Most of the non-smokers were not having any complication (46.6%) and post inflammatory hyperpigmentation (PIH) was the common complication (43.3%) whereas in smokers scars were present in 66.6% (Table 1). In acne patients the number of cigarettes smoked was more as compared to controls.

Table 1: Acne profile in non-smokers and smokers.

Variables		Non Smoker Acne N=90	Smoker Acne N=36	Statistical analysis
Age of onset Of acne	**11-20**	72(80%)	12(33.3%)	X^2=25.2. *P*= .000001
	20-30	18(20%)	24(66.6%)	
Duration of acne	**<6 months**	30(33.3%)	11(30.5%)	X^2=13.5759. P=.003543
	>12 months	37(41.1%)	8(22.2%)	
	>24 months	17(18.8%)	6(16.6%)	
	>60 months	6(6.6%)	11(30.5%)	
Site	**Forehead**	35(38.8%)	2(5.5%)	X^2=61.3243. P< 0.00001
	Malar	26(28.8%)	11(30.5%)	
	Mandibular	3(3.3%)	22(61.1%)	
	Chest	11(12.2%)	0	
	Back	15(16.6%)	1(2.8%)	
Lesions	**Comedones**	41(45.5%)	3(8.33%)	X^2=52.3431 P< 0.00001
	Papules	43(47.7%)	9(25%)	
	Pustules	4(4.4%)	15(41.6%)	
	Nodules	2(2.2%)	9(25%)	
Grades of acne	**1**	41(45.5%)	3(8.33%)	X^2=. 55.4228 P< 0.00001
	2	44(48.8%)	9(25%)	
	3	3(3.3%)	15(41.6%)	
	4	2(2.2%)	9(25%)	
Complications	**PIH**	39(43.3%)	9(25%)	X^2=44.376. P< 0.00001
	Scars	9(10%)	24(66.6%)	
	Nil	42(46.6%)	3(8.33%)	

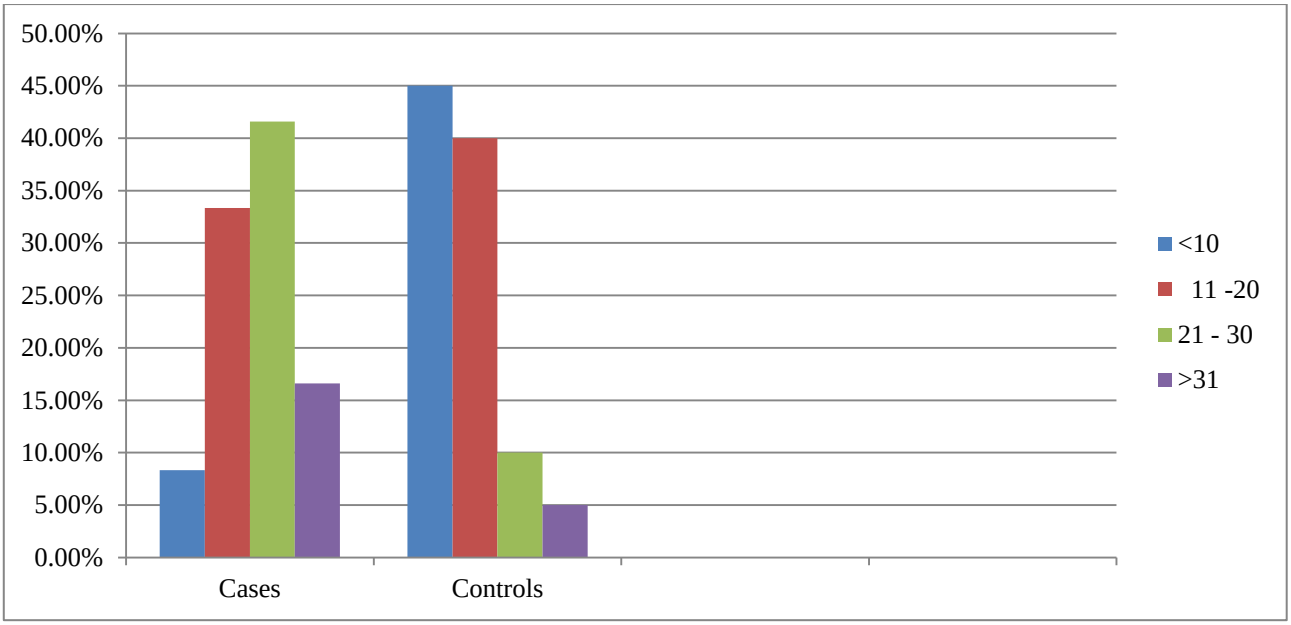

Figure 1: Number of cigarettes smoked in cases and controls.

Table 2: Severity of smoking in cases and controls.

Variables		Cases Smokers N=36	Controls Smokers N=20	Statistical analysis
No of cigarettes	<10	3(8.33%)	9(45%)	X^2 =13.87 P=0.0030
	11-20	12(33.3%)	8(40%)	
	21-30	15(41.6%)	2(10%)	
	>31	6(16.6%)	1(5%)	
FTND score	Low-moderate	15(41.6%)	17(85%)	X^2 =9.85 P=0.0016
	High	21(58.3%)	3(15%)	

Table 3: Risk of acne in smokers.

Smoking	Acne cases N=126	Controls N=126	Odds ratio	95% CI	Z statistics	P value
yes	36	20	2.1200	1.1466 to 3.9197	2.396	P =0.0166
no	90	106				

Most of controls were smoking less than 20 per day where as in acne 11-30 cigarettes per day (Fig-1). Many acne smokers were having high FTND scoring compared to the controls and this difference was statistically significant (Table 2).

There was positive correlation between the number of cigarettes and the grading of the acne(r=0.4515).When odds ratio was applied the risk of acne was 2.12 times more in smokers than in non-smokers (Table 3).

DISCUSSION

Everybody's skin is unique; it mostly depends on genetic makeup and lifestyle habits. Men also deal with skin problems like aging, acne, and pigmentation similar to women. Physical appearance especially skin is vital for any individual's self-image and social interaction as they form new personal and professional relationships to acquire individual status in society. Current research indicates that the pathogenesis of acne involves four main processes: follicular hyperproliferation; excess sebum production; inflammation; and the proliferation of Propionibacterium acnes.[6] An epidemiological study reported prevalence of acne was 29.9% in men.[7] Adult males produce about 10 times as much testosterone as women. The key role in the aetiology of acne in men is due to increased sensitivity of sebaceous end organ to androgens and increased peripheral metabolism of androgen which enhance the sebum production, follicular keratosis and eventual inflammation.[8-10]

Previous reports on association between smoking and acne showed diversified conclusions due to heterogeneity

definitions of smokers, acne grading and confounding variables.[1,7] In this era of stressful modern life, smoking is one of the vital reversible cause of morbidity and mortality. Tobacco smoke is a complex mixture of gaseous and particulate compounds, many of which have the potential of causing physiological and pharmacological effects.[11] It is directly associated variety of skin diseases like psoriasis, pustular palmoplantar psoriasis, suppurative hidradenitis, systemic and discoid lupus erythematosus, and cancers in the lip, oral cavity and anogenital regions.[3,12,13] Certain dermatoses explicitly seen in smokers include nicotine stomatitis, black hairy tongue, periodontal diseases and some types of urticaria and contact dermatitis.[3] Specific skin changes that were attributed to smoking such as wrinkles, atrophy, grey appearance or red complexion are used to describe a `smoker's face' and impaired wound healing.[7,14]

There are few reports on protective effects of smoking in certain inflammatory diseases like pemphigus vulgaris , ulcerative colitis, recurrent aphthous stomatitis labial herpes simplex and dermatitis herpetiformis.[15-18] A controversial relationship between smoking and melanoma, cutaneous squamous cell carcinoma and basal cell carcinoma has been also proposed.[13]

We observed smokers having predominantly inflammatory lesions (pustules> papules and nodules), with few comedones. In contrary other authors reported clinically non-inflammatory post-adolescent acne among smokers. Nicotinic receptors are expressed on keratinocytes, fibroblasts and blood vessels. So smoking provokes important alterations on keratinocytes, the collagen and elastin synthesis and skin microcirculation. At higher concentrations of 100 µg/ml, nicotine induces cutaneous hyperkeratinisation by increase in keratinocytes adhesion, differentiation, apoptosis and inhibition of migration. The ability of cigarette smoke to induce peroxidation on sebaceous lipids and the relative deficiency of antioxidants could be considered as an element capable of contributing to the onset and/or exacerbation of acne.[19-21]

The relationship between smoking and acne is still unclear. Smoking causes many alterations on the skin which includes variation in sebum composition with increase in squalene peroxide and decrease in α-tocopherol, increase in oxidative stress, inhibition of endothelial synthesis of prostaglandin causing vascular contraction, reduced synthesis and precipitation of mature collagen in the extracellular matrix.[22,19,23] Cigarettes contain arachidonic acid and polycyclic aromatic hydrocarbons, which lead to a phospholipase A2-dependent inflammatory pathway. This effect may further stimulate the synthesis of arachidonic acid which affect the activity of the apocrine glands and neutrophilic granulocytes.[24,25]

In our study, there was a remarkable difference in age of onset of acne between smokers and nonsmokers. Smokers developed acne in early adulthood (20- 30 years) whereas nonsmokers during adolescence (11-20 years). Analogous to a study from Iran where smokers developed acne at an older age than non-smokers.[24] In an epidemiological study by Schafer et al, peak prevalence was seen between 14 and 29 years.[7] This delayed onset of acne in smokers may be due to our cultural backdrop where exposure to smoking is during adulthood because of peer pressure. As there is no clear explanation for the delayed onset of acne in smokers, we hypothesize that nicotine would have triggered the onset of acne.

According to the observations by Nahidi et al, face was involved followed by the back, chest and shoulder, respectively.[24] Similarly we found mandibular and malar area of the face been affected among most of the smokers and only 2.8% of them had on back. In terms of the acne severity, 3% had mild, 65.4% had moderate and 31.65% had severe acne was reported in an Iranian study.[24] We noted grade 3 severity in 41.6% and equal distribution in grade 2 (25%) and grade 4 (25%). As we have selected hospital referred acne cases, the possibility of higher grades of acne will be more in smokers.

We observed that 66.6% had scars and PIH in 25% of smokers. Studies have shown an impairment of wound healing by cigarette smoke may be caused by impaired vaso-reactivity, relative ascorbic acid deficiency, and impaired collagen synthesis. [7,26, ,27] In contrary Nahidi et al found hyperpigmentation (92.5%) was common followed by atrophic scars (48.9%), and keloids and hypertrophic scars (5.3%) among smokers.[24]

The number of cigarettes smoked by cases and controls was 11-30 and < 20 per day respectively. More than half of the cases had higher FTND score whereas controls had low to moderate scores. This suggests nicotine dependence was significantly higher in patients with acne as compared to controls. We noted that there was a positive correlation between grading of acne and number of cigarettes. These observations suggest that the number of cigarettes increases the chances of developing higher grades of acne. Thus it is justified to contemplate smoking as a risk factor for acne. Similarly in a study by Chuh et al, it was concluded that smoking was likely to have a positive association with acne in men.[27]

We observed risk of developing acne was doubled in smokers. In a previous report all the patients with serious acne were heavy smokers (>15 cigarettes/day) and the probability to be affected by current acne in smokers was four times higher than in non-smokers.[21] According to analysis by Schafer et al, the prevalence of acne was significantly higher in active smokers (40.8%) and a significant linear association between acne severity and daily cigarette consumption was obtained.[7] The clarification of the association between acne and smoking is imperative as adolescents and young adults are likely to be highly aware of immediate effects of smoking on their body images rather than effects on their

cardiovascular and other systems that may occur decades later.[27]

Studies by Klaz et al and Rombouts et al have implied a negative relationship between acne severity and smoking.[1,25] This was supported by the hypothesis that some compounds of cigarette, like nicotine, had a possible anti-inflammatory effect on acne by Mills et al.[28] The justification is that smoking has immunosuppressive effects, affecting the cells through innate immunity factors such as macrophages, neutrophils and natural killer cells and also by adaptive immunity such as B and T lymphocytes.[29] Nicotine also inhibits inflammation indirectly through effects on the central and peripheral nervous system through brain-immune interactions.[30]

Previous studies by Jemec et al and Firooz et al, compared smoking status in acne among patients suffering from other dermatological conditions. They did not find statistically significant association between acne and smoking.[31,32] The above mentioned studies cannot be compared with our results as their subjects were suffering from other dermatological ailments which may have altered the outcome .

Further community based studies are required to heighten the literature regarding outcome of smoking on the course of acne. Strength of our study includes acne severity was assessed by a dermatologist and usage of a validated scale for nicotine dependence by psychiatrist thus avoiding inconsistency in analyzing the results. Confounding factors such as sex hormones related to gender were eliminated by selecting male acne patients. There are very few studies done to know the association between acne and smoking and this is the first hospital based study in India. As it was a cross-sectional hospital based study we could not analyze cause and effect of smoking on acne.

Our observations suggest that smoking is positively correlated with acne in men. So smoking can be considered as a risk factor while dealing with preventive strategies in acne patients. Though clinical reports suggest smoking as a risk factor, there is paucity of epidemiological studies in this aspect.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Klaz I, Kochba I, Shohat T, Zarka S, Brenner S. Severe acne vulgaris and tobacco smoking in young men. J Invest Dermatol. 2006;126(8):1749-52.
2. Cunliffe WJ, Simpson NB: Disorders of the sebaceous glands. In: Rook/Wilkinson/Ebling textbook of dermatology Edited by: Champion RH, Burton JL, Burns DA, Breathnach SM. Oxford: Blackwell Science; 1998: 1951-2.
3. Just-Sarobe M. Smoking and the skin. Actas Dermosifiliogr. 2008;99:173-84.
4. Durai PC, Nair DG. Acne vulgaris and quality of life among young adults in South India. Indian J Dermatol. 2015;60:33-40.
5. Heatherton TF, Kozlowski LT, Frecker RC, Fagerstrom KO. The Fagerstrom Test for Nicotine Dependence: a revision of the Fagerstrom Tolerance Questionnaire. British Journal of Addiction. 1991;86(9):1119-27.
6. Duquia RP, de Almeida HL Jr, Breunig JA, Souzat PR, Göellner CD. Most common patterns of acne in male adolescents: a population-based study. Int J Dermatol. 2013;52(5):550-3.
7. 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(1):100-4.
8. C Aguirre. Understanding Male Skin - The International Dermal Institute. Available at www.dermalinstitute.com/us/library/73_article_Understanding_Male_Skin.html Accessed on 20th May 2016.
9. 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(2):399-4.
10. Seirafi H, Farnaghi F, Vasheghani-Farahani A, Alirezaie NS, Esfahanian F, Firooz A, et al. Assessment of androgens in women with adult-onset acne. Int J Dermatol. 2007;46(11):1188-91.
11. Thomsen SF, Sorensen LT. Smoking and skin disease. Skin Therapy Lett. 2010;15:4-7.
12. Freiman A, Bird G, Metelitsa AI, Barankin B, Lauzon GJ. Cutaneous effects of smoking. J Cutan Med Surg. 2004;8(6):415-23.
13. Sela BA. Dermatological manifestations of smoking. Harefuah. 2002;141(8):736-40.
14. Model D. Smoker's face: an underrated clinical sign? Br Med J. 1985;291:1760-2.
15. Sullivan TP, Elgart GW, Kirsner RS. Pemphigus and smoking. Int J Dermatol. 2002;41:525-31.
16. Motley RJ, RhodesJ, Ford GA, Wilkinson SP, Chesner IM, Asquith P, Et al. Time relationships between cessation of smoking and onset of ulcerative colitis. Digestion. 1987;37:125-7.
17. Axell T, Henricsson V. Association between recurrent aphthous ulcers and tobacco habits. Scand J Dent Res. 1985;93:239-42.
18. Wolf R, Orion E, Matz H, Maitra S, Rowland-Payne C. Smoking can be good for you. J Cosmet Dermat. 2004;3:107–11.
19. Theilig C, Bernd A, Ramirez-Bosca A, Görmar FF, Bereiter-Hahn J, Keller-Stanislawski B, et al. Reactions of human keratinocytes in vitro after application of nicotine. Skin Pharmacol. 1994;7(6):307-15.
20. 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 Pharmacol Appl Skin Physiol. 2002;15:63–8.
21. Capitanio B, Sinagra JL, Ottaviani M, Bordignon V, Amantea A, Picardo M. Acne and smoking . Dermatoendocrinol. 2009;1:129–35.
22. Handelman GJ, Packer L, Cross CE. Destruction of tocopherols, carotenoids and retinol in human plasma by cigarette smoke. Am J Clin Nutr. 1996;63(4):559–65.
23. Monfrecola G, Riccio G, Savarese C, Posteraro G, Procaccini EM. The acute effect of smoking on cutaneous microcirculation blood flow in habitual smokers and nonsmokers. Dermatology. 1998;197(2):115-8.
24. Nahidi Y, Javidi Z, Shakeri MT, Farrokhnezhad S, Does cigarette smoking influence acne? Iran J Dermatol. 2012; 15: 80-84.
25. Rombouts S, Nijsten T, Lambert J. Cigarrete smoking and acne in adolescent: result from a cross-sectional study. J Eur Acad Dermatol Venereol. 2007;21:326-33.
26. Goldminz D, Bennett R. Cigarette smoking and flap and full thickness graft necrosis. Arch Dermatol. 1991;127:1012-15.
27. 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;29:597–99.
28. Mills CM, Petters TJ, Finlay AY. Dose smoking influence acne? Clin Exp Dermatol. 1993;18:100-1.
29. Sopori M. Effects of cigarette smoke on the immune system. Nat Rev Immunol. 2002;2(5):372-7.
30. Sopori ML, Kozak W, Savage SM, Geng Y, Soszynski D, Kluger MJ,et al. Effect of nicotine on the immune system: possible regulation of immune responses by central and peripheral mechanisms. Psychoneuroendocrinology. 1998 ;23(2):189-204.
31. Jemec GB, Linneberg A, Nielsen NH, Frølund L, Madsen F, Jørgensen T. Have oral contraceptives reduced the prevalence of acne? a population-based study of acne vulgaris, tobacco smoking and oral contraceptives. Dermatology. 2002;204(3):179-84.
32. Firooz A, Sarhangnejad R, Davoudi SM, Nassiri-Kashani M. Acne and smoking: is there a relationship? BMC Dermatol. 2005;24;5:2.

Cite this article as: Hosthota A, Bondade S, Renu K, Braroo S. The association of acne vulgaris with smoking in men: a hospital based study. Int J Res Dermatol 2017;3:196-201.