Orginal Article

Association between Acne and Smoking: A Hospital Based Case Control Study

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Abstract

Introduction: : Acne vulgaris is a disease of the pilo-sebaceous gland that has a chronic course. A number of environmental factors can cause acne. There is conflicting evidence on a potential link between smoking and acne. It is generally accepted that smoking causes significant changes in the keratinocytes, in skin microcirculation, and in the collagen and elastin synthesis.

Methods: This was an analytical observational case-control study conducted at the Department of Dermatology of KIST Medical College and Teaching Hospital, Lalitpur, Nepal. Any patients 18-45 years of age attending the Dermatology Outpatient Department and diagnosed as having acne vulgaris were taken as cases. Any patients 18-45 years of age attending the Dermatology Outpatient Department with skin disease other than acne were taken as a control. A chi-square test was applied to determine the association between two categorical variables. Statistical significance was tested at a 95% confidence interval, and a p value less than 0.05 was considered significant. Odds ratio was calculated to determine association between acne vulgaris and smoking.

Results: There were 175 cases with acne vulgaris and 175 controls with skin disease other than acne. Among cases with acne vulgaris 26 (14.9%) were smoker out of which 8 (4.6%) were female and 18 (10.3%) were male. In control group 20 (11.4%) were smoker out of which 4 (2.3%) were female and 16 (9.1%) were male. The odds ratio (OR) for association between acne vulgaris and smoking was 1.35 with a 95% confidence intraval (CI) range (0.72-2.53) which was not significant.

Conclusion: An association between acne vulgaris and cigarette smoking was not found in this study. The results of this study did indicate a significant difference between smoking and acne frequency in males and females.

Keywords: Acne vulgaris, pilosebaceous unit, Smoking.

Introduction

Acne vulgaris is a disease of the pilo-sebaceous gland that has a chronic course. It is due to hyper-seborrhea, abnormal follicular keratinisation, and Propionibacterium acnes proliferation in the pilosebaceous unit.[1] It is common in adolescence, but data show that the prevalence of acne is increasing in adult patients, which is more evident in women . The classic definition of adult acne is acne that appears beyond the age of 25 years. Adult acne are classified as late-onset acne and persistent acne. Adolescent acne that continue beyond the age of 25 is referred to

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as persistent adult acne, while first onset of acne after the age of 25 is referred to as late-onset adult acne.[2] Acne is brought on by both exogenous and endogenous triggers. Hormonal dysfunction and a genetic predisposition are the most frequent endogenous causes of adult acne. Several external triggers have been identified; including smoking, cosmetics, stress, and exposure to comedogenic substances.[3]There is conflicting evidence on a potential link between smoking and acne. It is generally accepted that smoking causes significant changes in the keratinocytes, in skin microcirculation, and in the collagen and elastin synthesis. Fibroblasts, blood vessels, and keratinocytes all express nicotinic receptors. It reduces inflammation by directly affecting immune cells as well as the central and peripheral nervous systems. Reduced antioxidant levels caused by smoking, which may change the composition of sebum.[4]

Methods

This was an analytical observational case-control study conducted at the Department of Dermatology of KIST Medical College and Teaching Hospital, Lalitpur, Nepal, a tertiary care centre, from January 2024 to November 2024 after taking ethical clearance from the institutional review committee of the institute. Any patients 18-45 years of age attending the Dermatology Outpatient Department of KIST Medical College and Teaching Hospital Lalitpur, Nepal, and diagnosed as having acne vulgaris were taken as cases. Pregnant females and lactating mothers, patients on systemic corticosteroids, and those with a history of contraceptive use in females were excluded from the case. Any patients 18-45 years of age attending the Dermatology Outpatient Department of KIST Medical College and Teaching Hospital, Lalitpur, Nepal, with skin disease other than acne were taken as a control after matching age and sex. Pregnant females and lactating mothers were excluded from control. Purposive sampling technique was used. Written and informed consent was obtained in the prescribed format from the patients selected for the study after explanation of the details of the study. Detailed history, including age, occupation, duration of disease, and site of involvement, was taken. Dermatological examination with respect to the morphology, distribution, and any special features of the lesions was done and recorded in a predesigned proforma. Smokers who smoke tobacco everyday were taken as having a positive smoking history in this study. Acne can be categorised as mild, moderate, or severe. Non-inflammatory lesions (comedones), a few inflammatory (papulopustular) lesions, or both are defined as mild acne. More inflammatory lesions, infrequent nodules, or both, together with mild scarring, are characteristics of moderate acne. Widespread inflammatory lesions, nodules, or both, along with scarring, define severe acne.[5] Data collected were entered and analysed using the Statistical Products of Service Solutions (SPSS) version 22. A chi-square test was applied to determine the association between two categorical variables. Statistical significance was tested at a 95% confidence interval, and a p value less than 0.05 was considered significant. Odds ratio was calculated to determine association between acne vulgaris and smoking.

Result

There were 175 cases with acne vulgaris and 175 controls with skin diseases other than acne. The mean age of cases was 25.41±6.03 years, and the mean age of controls was 30.98±8.08 years, with an age range from 18 to 45 years in both case and control group. There was a female preponderance of cases in our study with 120 (68.6%) females and 55 (31.4%) male patients with acne. In the control group also, there were 120 (68.6%) females and 55 (31.4%) males. The most common age groups to be involved in acne vulgaris were up to 25 years (95 cases, 54.3%) and 26-35 years (68 cases, 38.9%). Among cases with acne vulgaris, 26 (14.9%) were smokers, out of which 8 (4.6%) were females and 18 (10.3%) were males. Among 120 females with acne vulgaris, 8 (6.7%) were smokers, and among 55 males cases with acne vulgaris, 18 (32.7%) were smokers. And there is a significant difference between the smoking and occurrence of acne in males and females ($p = 0.001$). In the control group, 20 (11.4%) were smokers, out of which 4 (2.3%) were females and 16 (9.1%) were males. Out of total cases of acne vulgaris, the number of cases who smoke was 7 (4%) in the up to 25 years age group, 16 (9.1%) in the 26-35 years age group, and 3 (1.7%) in the 36-45 years age group. There is a significant difference between age groups of cases and smoking habits ($p = 0.01$). Among the cases who smoke, 8 (4.6%) had mild acne, 10 (5.7%) had moderate acne, and 8 (4.6%) had severe acne. There was not a significant difference between mild ($P = 0.1249$), moderate ($P = 0.7759$), and severe ($P = 0.113$) acne vulgaris and smoking habit. [Table 1]

Among cases who smoke, severe acne was seen more in those who smoked up to 5 cigarettes per day, and moderate acne was seen more in those who smoked 1 to 2 cigarettes per day. [Figure 1] Among 26 (14.9%) smoker cases, 11 (6.3%) smoke 1-2 cigarettes per day, 10 (5.7%) smoke 3-4 cigarettes per day, and 5 (2.9%) smoke greater than 5 cigarettes per day. Similarly, among 20 (11.4%) smokers in the control group, 12 (6.9%) smoke 1-2 cigarettes per day, 7 (4.0%) smoke 3-5 cigarettes per day, and 1 (0.6%) smokes greater than 5 cigarettes per day. There is no significant difference between the number of cigarettes smoked in cases and controls ($P=0.113$). [Table 2] For the association between smoking and acne vulgaris, the odds ratio (OR) was 1.35 with a 95% confidence interval (CI) range (0.72-2.53), and the P value was 0.343, which was not significant.

Table 1: Relation of different variables of acne and smoking habit

Gender		Non smoker	Smoker	Total	P Value
	Female	**112 (64%)**	**8 (4.6%)**	**120(68.6%)**	
	Male	**37 (21.1%)**	**18 (10.3%)**	**55(31.4%)**	**P=0.001**
Age Group	Upto 25 years	88 (50.3%)	7 (4.0%)	95 (54.3%)	
	26-35 years	52 (29.7%)	16 (9.1%)	68 (38.9%)	
	36-45years	9 (5.1%)	3 (1.7%)	12 (6.9%)	P=0.01
Severity of Acne	Mild	70(40.0%)	8 (4.6%)	78 (44.6%)	P=0.1249
	Moderate	53 (30.3%)	10 (5.7%)	63 (36.0%)	P=0.7759
	Severe	26 (14.9%)	8 (4.6%)	34 (19.4%)	P=0.1133

Table 2: Number of cigarette smoke in cases and controls

Number of cigarette smoked in a day	Case smoker	Control smoker	Total	P value
1-2	11 (6.3%)	12 (6.9%)	23 (6.6%)	
3-5	10 (5.7%)	7 (4.0%)	17 (4.9%)	P=0.113
Greater than 5	5 (2.9%)	1 (0.6%)	6 (1.7%)	
Total	26 (14.9%)	20 (11.4%)	46 (13.2%)	

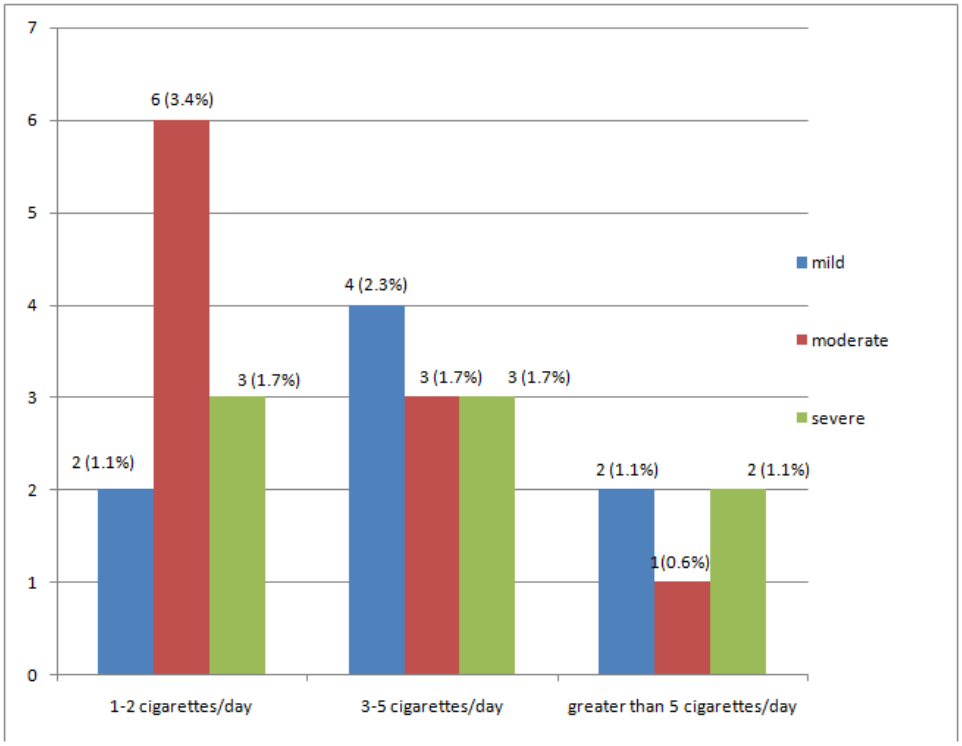


Figure 1: Bar diagram showing severity of smoking in acne cases in different grades of acne.

Table 3: Association between acne vulgaris and smoking

Exposure	Case	Control	Oddsratio(OR)	95% Confidence interval (CI)		P value
				Lower	Upper	
Smokers	26 (14.9%)	20 (11.4%)	1.35	0.72	2.53	P=0.343
Non smokers	149 (84.1%)	155 (88.6%)				

Discussion

In this study, an association was not found between acne vulgaris and smoking. The median age of our cases was 24, with an age range of 18 to 45 years. There was a female preponderance of cases in our study with 120 (68.6%) female patients and 55 (31.4%) males patients with acne. The most common age groups to be involved in acne vulgaris were up to 25 years (95 cases, 54.3%) and 26-35 years (68 cases, 38.9%). According to a study by Adityan B et al.[6] 137 (44.3%) of the 309 patients were female, and 172 (55.7%) were male. The patients ranged in age from thirteen to forty-five. The age categories with the highest frequency of acne vulgaris were 16–20 years old (185 cases, 59.8%) and 21–25 years old (60 cases, 19.4%).

In our study among cases with acne vulgaris, 26 (14.9%) were smokers, out of which 8 (4.6%) were females and 18 (10.3%) were males. Among 120 females with acne vulgaris, 8 (6.7%) were smokers, and among 55 males cases with acne vulgaris, 18 (32.7%) were smokers. And there is a significant difference between the smoking habit and occurrence of acne in males and females (p = 0.001). According to a study by Chuh AA et al.[7] 25 out of 379 male controls and 53 out of 379 male patients with acne smoked (P = 0.001; OR, 2.3; 95% CI, 1.4-3.8). Three of the 253 female controls and six of the 253 female acne patients smoked (OR, 2.0; 95% CI, 0.5-9.4). They conclude that there is likely a positive correlation between smoking and male acne.

In our study Out of total cases of acne vulgaris, the number of cases who smoke were 7 (4%) in the up to 25 years age group, 16 (9.1%) in the 26-35 years age group, and 3 (1.7%) in the 36-45 years age group. There is a significant difference between age groups of cases and smoking habits (p = 0.01). According to a meta-analysis by Zhang JZ et al.[8] smoking increases the risk of adult acne and acne in the Asian population. In our study among the cases who smoke 8 (4.6%) had mild acne, 10 (5.7%) had moderate acne, and 8 (4.6%) had severe acne. There is not significant difference between mild (P =0.1249), moderate (P=0.7759), severe (P=0.113) acne vulgaris and smoking habit. A similar study by Hosthota A et al.[9] revealed that grade 3 acne was more common in smokers, whereas grade 2 acne was more common in non-smokers.

Firooz A et al.[10] conducted a study in which the questionnaires were filled out by 301 patients with various skin conditions and 293 people with acne. A total of 27 (9.0%) control patients and 12 (4.1%) acne patients were smokers at the time of the study (odds ratio = 0.43, 95% CI 0.22 – 0.87, $p < 0.05$). However, this difference was not significant after adjustment for sex (odds ratio: 0.61, 95% CI: 0.30–1.26, $p > 0.05$), and an association between acne and cigarette smoking was not found. In another study, Klaz I et al.[11] found that the prevalence of severe acne was substantially lower in active smokers (0.71%) than in nonsmokers (1.01%) (P=0.0078). An inverse dose-dependent relationship between the prevalence of severe acne and daily cigarette intake became significant from 21 cigarettes per day (X^2 and trend test: P<0.0001), odds ratio: 0.2 (95% CI: 0.06–0.63). Similarly, in our study, 26 cases and 20 controls were everyday smokers. The odds ratio (OR) was 1.35 with a 95% confidence intraval (CI) range (0.72-2.53) and P value was 0.343 which was not significant and association was not found between acne vulgaris and smoking. In another study Mannocci A et al[12] found the association between acne and smoke (OR=7.26) with a statistically significant CI, which shows an elevated risk. Additionally, the risk is doubled for those over 18 years compared to those under 18 years (OR=2.31).

Conclusion

Previous research on the association between acne vulgaris and smoking has produced contradictory results. This study finding did not reveal an association between acne vulgaris and smoking but the results of this study did indicate a significant difference between smoking and acne frequency in males and females. The study's limitations include its small sample size and the fact that it was carried out on a small population; for better results, a large sample size and participant selection from various centers are needed.

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