ASSOCIATION BETWEEN CIGARETTE SMOKING AND ACNE VULGARIS

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ABSTRACT

Acne is a disease involving pilosebaceous unit commonly affecting adolescents. Acne has a multifactorial aetiology but in recent years, studies have shed some light in the relationship between cigarette smoking and acne. As previous studies linking cigarette smoking and acne had produced conflicting results, we conducted this study to provide comprehensive information of cigarette smoking and its association with acne in Nepalese population. The study comprised all participants who met the inclusion criteria as well as a control group that was age and sex matched. The demographic profile, smoking history, previous history, drug history, and examination results were entered into a pre-set proforma. There were a total of 100 cases of acne patients (Group A) with age and sex-matched 100 controls (Group B). There were 69% females and 31% males. The majority of the acne patients (Group A) were students in 65%, as compared to 42% in control group. In group A, 95% never smoked and 5% were smokers (cigarettes). In group B, 98% never smoked and 2% were smokers (cigarettes). The commonest site of acne lesions was in face 64. Among the acne patients there were 27% mild acne, 58% moderate acne and 15% severe acne. There was no association found between cigarette smoking and acne (OR-2.57, 95% CI -0.4884 to 13.6173, P>0.05). There was no correlation between acne and smoking in Nepalese population. However, a larger sample size is recommended to confirm the correlation.

KEYWORDS

Acne, Nepal, smoking

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INTRODUCTION

Acne is a common condition usually seen in the adolescent population.[1] It affects over 80% of individuals in childhood or early adulthood. Acne is clinically characterized by multiple types of lesions that include comedones, papules, pustules, nodules, and scars.[2,3]

In a study by Jowett *et al*,[4] 64% of people said that their skin disease affected their socio-economic activity. The extent to which sufferers experienced embarrassment, anxiety, a lack of confidence, and depression is documented. Acne is considered a multifactorial disorder, with several studies linking it to diet, menstruation, stress, UV radiation, and occupation.[1,5] Smoking is not only associated with an increased risk of cardiovascular and pulmonary morbidities but is also responsible for a range of cutaneous adverse effects, including skin aging, poor wound healing, hair loss, and skin carcinomas.[6-9] Smoking causes alteration on the skin microcirculation, keratinocytes and on collagen and elastin synthesis. Nicotine receptors are expressed in keratinocytes, fibroblasts and blood vessels.[10-13]

The relationship between cigarette smoking and acne has been largely controversial. Studies done in Germany,[14] Hong Kong and India[15] have revealed that cigarette smoking aggravates acne. On the other hand, studies done in Israel[16] and France[17] have shown the protective effect of smoking on acne. Furthermore, there are other studies that have failed to detect any association between smoking and acne.[18] An extensive search of the standard databases did not reveal any similar study done in Nepal, therefore this study was undertaken to evaluate the true relationship between cigarette smoking and acne vulgaris.

MATERIALS AND METHODS

The study was hospital based cross-sectional, case control study. The study was conducted between December 2020 till July 2022, after taking ethical clearance from the Institutional Review Committee (IRC) of Nepal Medical College. The study population comprised of all patients with acne vulgaris attending the Outpatient Department of Dermatology and Venereology, Nepal Medical College, Attarkhel, Gokarneshwor-8, Kathmandu, Nepal. Similarly, age, sex matched control having non-acne vulgaris were included from the patients attending the outpatient Department of Dermatology.

Inclusion criteria:

- Group A: All patients with clinically diagnosed acne vulgaris
- Group B: Control subjects with non-acne vulgaris related complaints
- Above 12 years of age
- Give consent for the study

Exclusion criteria:

- Patients below 12 years of age
- Patients/guardians unwilling to give consent
- Associated co-morbidities
- Patients under acne treatment

All patients fulfilling the inclusion criteria were examined along with photographic documentation and patient particulars were noted separately in a pre-set proforma. The proforma included information on the age, gender, duration and severity of acne, extent and distribution of lesions. The proforma also collected information on the past and current smoking habits of the subjects, types of smoking, relevant past history, personal history, aggravating factors including menstrual flare in female subjects and written informed consent from participants. The data were manually uploaded into a secure database using SPSS-16. Descriptive statistics were used to describe the frequency, mean, standard deviation with 95% confidence interval. Level of significance was set at 5% ($p \leq 0.05$) and power set at 80%. T-tests were applied and calculated where appropriate.

RESULTS

There were a total of 100 cases of acne patients (Group A) and 100 age- and sex-matched controls 100 controls (Group B). There were 69% females and 31% males. The mean age of patients was 21.45 +/- years, with a minimum age of 12 years and a maximum age of 34 years. The majority of the acne patients were students (non-medical) 65%, followed by those in service 20%, homemakers 12%, and doctors (medical students and medical officers) 3%. In controls, 42% were students, 31% in services, 14% homemakers, and 13% doctors (medical students and medical officers). Skin texture in Group A (normal-1%, dry-1%, oily-8%, combination-90%) and in Group B (normal-86%, dry-4%, oily-2%, combination-8%). In Group A, 95% never smoked, and 5% were smokers

(cigarettes). In Group B, 98% never smoked, and 2% were smokers (cigarettes). Sleep disruption was present in 8% of Group A and 2% of Group B. Around 94% in Group A were non-vegetarians and 98% in Group B were non-vegetarian. On enquiring about the type of diet, about 67% of Group A has an intake of junk foods, compared to 98% of Group B. Thirty-six percentage of female patients with acne had a premenstrual flare. An increase in

Table 1: Charateristics of Acne patients

Age of onset		**n**
Duration of disease	<15years	34
	15-30years	62
	>30years	4
	<6months	35
	6months-1 year	17
	>1 year	48
Site of lesions	Face	64
	trunk	4
	>1 site	32
Type of lesions	Comedones	14
	Comedones+papules	43
	Comedones+papules+pustules	28
	Mixed (more nodules and cyst)	15
Scaring	Ice pick	18
	Box scar	5
	Rolling	4
	keloid	2
	Mixed	27
Previous acne treatment	None	90
	Topical	6
	systemic	4
Type of topical	Benzyl peroxide+Adapalene	3
	Adapalene+Clindamycin	2
	Clindamycin alone	1
Type of oral	Doxycycline	3
	Azithromycin	1
Grade of acne	Mild	27
	Moderate	58
	Severe	15

Table 2: Comparison of Cases (Group A) and controls (Group B) and the tests of significance

	Odds ratio (OR)	95% CI (confidence interval)	Significance level (P value)
Acne and smoking	2.57	0.4884 to 13.6173	0.2645
Severity of acne and smoking	36.43	2.14 to 618.04	0.012
Sleep disturbance and acne	4.26	0.8817 to 20.59	0.07
Sleep disturbance and smoking	4.12	0.45 to 37.52	0.208
Skin texture and smoking	2.57	0.48 to 13.61	0.2645
Skin texture and acne	103.50	39.07 to 274.13	0.0001
Acne and diet (non-vegetarian)	0.3197	0.0629 to 1.6240	0.1691
Acne and diet type (oily and junk food)	0.0414	0.0096 to 0.1785	0.0001

acne lesions was associated with stress in 29% of cases. The commonest site of acne lesions was the face (64%), and scarring was present in 57%. Regarding treatment history, around 6% had been taking topical treatments and 4% had taken oral treatments. Among the acne patients, there were 27% with mild acne, 58% with moderate acne, and 15% with severe acne. The characteristics of acne patients are given in detail in Table 1. There was no association found between cigarette smoking and acne (OR-2.57, 95% CI -0.4884 to 13.6173, P>0.05). Severity of acne with smoking was found to be statistically significant (OR-36.43,95% CI-2.14 to 618.04, P-0.012) and also with skin texture and acne. Skin texture, sleep disturbances with smoking and acne were statistically not significant but junk food (OR-0.0414, 95% CI-0.0096 to 0.1785, P <0.05) was found to be statistically significant (Table 2).

DISCUSSION

There have been several studies that have assessed the association between acne vulgaris and cigarette smoking. The studies conducted so far have shown contradictory results, and most of the studies were from western countries. Thus, to find the association between acne vulgaris and smoking with a case control design, the present study was conducted.

The analysis with the case-control studies is more reliable as it is possible to determine if subjects have developed acne before or after starting smoking, as it correlates the incident cases with the smoke exposure, which certainly comes before the acne.[19,20]

Smoking causes delay in wound healing and causes skin aging.[13,21] Pelle *et al*[22] mentioned that peroxidation was induced in human skin by cigarette smoke and eventually inhibited by the presence of antioxidants. Handelman *et al.*[23] found destruction of tocopherols, carotenoids, and retinol in human plasma by cigarette smoke.

Cigarette smoke contains a type of polycyclic aromatic hydrocarbon called benzo(a)pyrene, that triggers the secretion of IL-8 from the epidermal keratinocytes, which is related to inflammatory acne.[24] Furthermore, impaired vasoreactivity, relative ascorbic acid deficiency, impaired collagen synthesis, and wound healing in smokers may contribute to the association between smoking and acne.[25]

Also, in general, smokers tend to be more severely affected than non-smokers in the majority of inflammatory skin diseases like psoriasis, hidradenitis suppurativa, cutaneous lupus erythematosus, and acne.[26]

A multicenter, case-controlled study from Turkey found that smoking was more common in patients with severe acne.[27] It has also been assumed that subjects who are under greater psychological stress are more dependent on cigarette smoking and likely to have worsening of acne.[27,28]

A recent meta-analysis concluded that smoking is a risk factor for acne in the Asian population and adult acne. Only three case control studies were included in the meta-analysis. The authors suggested further studies be conducted, especially in larger samples, to confirm these findings.[29]

ln the study by Mannocci *et al*,[19,20] the association between acne and smoking showed an increased risk (OR = 7.26) with a statistically significant confidence interval (95% CI: 2.27-23.18). Also in the same study, the analysis made with case-control studies with a quality score >6, the association between smoking and acne, reported a significant increase in the risk.

However, in our study, no association was found between cigarette smoking and acne (OR-2.57, 95% CI -0.4884 to 13.6173, P>0.05). This may be due to hesitancy of the younger population to reveal their personal history of smoking in front of their parents or seniors. Moreover, most of the cases and controls were non-smokers, which could have contributed to the statistical lack of association between smoking and acne. A larger sample size may better help identify this relationship.

Similarly, in another case control study of East Jerusalem, the association between acne vulgaris and smoking showed an adjusted OR of 1.237 with a 95% CI (0.659- 2.319) which was not significant.[26] Another similar case control study from Malaysia did not find a statistically significant association between the cases and controls in terms of the history of cigarette smoking. The study was conducted among 57 acne vulgaris patients and 57 age, gender, and ethnicity-matched controls.[30] A multicenter case-control study of risk factors for moderate to severe acne in people aged 10 to 24 years did not find any association, positive or negative, of smoking with acne.[31] Also, various other cross-sectional studies could not detect any association between acne and smoking.[18,32,33]

In contrast, some studies have shown a negative relationship between acne and smoking. Mills *et al*[34] found that a few constituents of cigarette smoke, probably nicotine, to have an anti-inflammatory effect on acne. Rombouts *et al*[35] conducted a cross-sectional study, out of the 594 participants, 36.2% had acne. Smoking

appeared to be protective in the development of inflammatory acne in girls, smoking was significantly associated with less prevalence of acne (adjusted OR = 0.41, 95% CI = 0.13, 0.82). In another cross-sectional study by Klaz *et al*,[16] active smokers showed a significantly lower prevalence of severe acne.

The differences in the results of the same study topic worldwide could be due to methodology differences between the study populations, a lack of meta-analysis with an adequate number of case control studies, and inherent biases collected from physician diagnoses and patient self-reported acne.[29,36]

Our study had 100 cases of acne patients with age and sex-matched 100 controls. The majority of the acne patients and controls were students. A similar case control study from Malaysia recruited 57 cases and was matched with 57 controls.[30] The majority of patients and controls were also students. In our context of teaching hospital, students not revealing their personal history of smoking out of fear from doctors, seniors or teachers might have also affected the result of the lack of association between smoking and acne.

In our study, there were 69% females, and 31% males. A similar case-control study with inclusion criteria of male gender between 15 to 30 years old showed a positive relationship between smoking and acne.[36] In our study, inclusion criteria not being limited just to the male gender could have resulted in a lack of association. Gender has been significantly associated with cigarette smoking status, with a higher proportion in males.[37] Among the acne patients there were 27% mild acne, 58% moderate acne and 15% severe acne. Whereas, a hospital-based study from India showed patients with grade 1 acne outnumbered patients with more severe inflammatory acne. In the same study men who were smokers had severe grades of acne compared to non-smokers (P =0.001).[25] Hence, further studies are suggested that consider likely differences across gender and type of acne to explain the association between smoking and acne.

Products such as salty snacks, desserts, and sweets are considered junk foods however, the exact definition has not been documented in the literature.[38] Recent studies have revealed the association between dietary factors such as a Western diet or high-glycemic-load diet and acne.[39,40] In recent years westernization in food habits of Nepali people has been observed, and this might have contributed to the significant association between junk food and acne (OR-0.0414, 95% CI-0.0096 to 0.1785, P <0.05).

In our study, significant association was not seen in between sleep and acne (P>0.05). The association of acne severity and sleep has been linked to dynamic interplay of both psychiatric and pathophysiologic mechanisms.[41]

In conclusion, the studies that have been conducted so far have given contrasting results. Even though our study found no correlation between smoking and acne, a larger prospective study may help elucidate the relationship. Smoking is detrimental to health. If there is any association between acne and smoking, awareness program can be instituted to educate the younger population particularly school children, adolescents, about how smoking affects skin.

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