Association between smoking habits and acne vulgaris. A case-control study

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ABSTRACT

BACKGROUND: acne *vulgaris*, is one of the most common skin disorder. Previous studies about the role of smoke in the pathogenesis of acne reported contradictory results. The aim of this study was to conduct a case-control study investigating the relationship between tobacco smoking and acne.

METHODS: a case-control study was performed during the period September 2009 - February 2010. A questionnaire was administrated to each participant, to assess the association acne - smoke. Cases were outpatients of the Dermatologic Ambulatory of the "Fiorini" Hospital, Sapienza University of Rome (Italy). Controls were age and gender-matched to the cases. The ratio cases-controls was 1:2.

A univariate and a multiple logistic regression analysis were conducted; Odds Ratio (OR) and the relative 95% confidence interval (95%CI) were assessed. The statistical significance was set at p < 0.05.

RESULTS: crude OR for the association acne - smoke was 7.26 (IC=2.27-23.18); adjusted OR for sex and age was 5.47 (IC=1.67-17.97). Of 93 cases, 6 had a severe grade of acne (6.5%), 19 had an intermediate grade of acne (20.4%), and 68 had a mild grade of acne (73.1%). No one of the smokers had a severe grade of acne, one had an intermediate grade of acne and 11 had mild acne; these differences are not statistically significant.

CONCLUSIONS: the association between acne and smoke shows an increased risk (OR=7.26) with a statistically significant CI. Moreover, people ≥ 18 years of age have twice the risk compared to persons < 18 years of age (OR=2.31).

Key words: Acne, Smoke, Tobacco, Cigarettes, Case-control study

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INTRODUCTION

Previous studies have reported conflicting results about the association between smoking habit and acne. It's well known that cigarette smoking contributes to an increased risk of coronary artery disease, stroke, atherosclerotic peripheral vascular disease, many types of cancer, chronic pulmonary disease (1). In addition, ample clinical evidence suggests that smoking is associated with several dermatologic diseases and with several adverse effects on the skin like psoriasis, *pustulo-*

sis palmoplantaris, hydrosadenitis suppurativa, systemic and *discoid lupus erythematosus*, cancer of the lips, premature skin aging, melanoma, squamous and basal cell carcinoma of the skin (2-4).

The role of smoking habit regarding acne *vulgaris* is more discussed.

Acne *vulgaris* is a common skin disease with a multifactorial pathogenesis, that usually starts in adolescent and resolves slowly by mid-20s but it may persist up to the age of 40 or more (5, 6).

Post-pubertal acne *vulgaris* is described as an inflammatory mild-moderate form, whose cause a still unknown and whose incidence is increasing (7).

Recent investigation studies revealed smoking to be a clinically important contributor to acne *vulgaris* prevalence and severity with OR between 1.45 and 6.62 (4, 7-10), although some studies did not confirm this association: in fact, even data exists on possible smoking protective effects due to the anti-inflammatory properties of nicotine, or possibly some other components of cigarettes, was found OR included between 0.43 and 0.71 (6, 11-14).

The aim of this study was to conduct a case-control study investigating the relationship between tobacco smoking and acne *vulgaris*.

METHODS

Study design and population

A case-control study was carried out according to the STROBE checklist (15, 16). Cases were outpatients of the Dermatologic Ambulatory Service of the "Fiorini" Hospital in Terracina, Dermatology Unit "D. Innocenzi", Sapienza University of Rome (Lazio, Italy), consecutively admitted to the service during the period 1st September 2009- 1st February 2010.

Eligibility criteria were: first diagnosis of acne *vulgaris*; individuals aged 16 years and over; no contraceptive use in women; no previous medication for acne *vulgaris*; no personal history of cardiovascular diseases or diabetes mellitus.

Controls were chosen in the same period among healthy population, age and gender-matched to the cases, among the same community where cases arose (community-based case-control study).

The ratio cases-controls was 1:2.

The sample size was calculated using the following parameters:

- Sensibility = 0.95
- Power = 0.80
- Estimate of smoking prevalence among general population = 25%

- OR estimating the relationship between tobacco smoking and acne *vulgaris* = 2.5

According to the above parameters, using the Statcalc EpiInfo Calculator, we estimated to enroll in the study at least 69 cases and 138 controls.

For the present study, a total of 293 patient records were collected: 93 patients with acne *vulgaris* and 200 controls.

Statistical analysis

A questionnaire was administrated to each participant in order to assess the correlation between acne *vulgaris* and smoke, collecting data concerning age <18 or ≥18 (since people who reached the major age can buy cigarettes more freely), gender (M/F) and smoking habits (yes/no). The presence/absence of acne was diagnosed by a dermatologist.

No missing data have been found.

Absolute and relative frequency distributions and contingency tables have been composed.

Differences between cases and controls were analyzed using parametric and non-parametric tests. Differences for categorical variables were tested using chi-square test, while those pertaining continuous ones were analyzed using the Student t-test.

A univariate logistic regression analysis was conducted for estimating the variables who predicted the odds of being case (being a patient with acne). This risk was estimated through the calculation of the Odds Ratio (OR) and the relative 95% confidence interval (95%CI).

Finally, a multiple logistic regression analysis was conducted for assessing the influence on the outcome (being a patient with acne) of the variables that at the univariate analysis yielded a p-value < 0.25, or potentially confounders, using the procedure described by Hosmer and Lemeshow. The stepwise approach with "backward elimination" procedure was followed. The goodness of fit of the model was estimated using the Hosmer-Lemeshow test.

The statistical analysis was conducted using the statistical package SPSS for Windows (release 12.0) the statistical significance was set at p < 0.05.

RESULTS

As is showed in Table 1, total of 293 patient records of 93 patients with acne *vulgaris* and 200 controls were reviewed.

Of the 93 patients with acne *vulgaris*, 34 were male and 59 were female.

Median age of female smokers were 25 years (range of median age of female with acne *vulgaris* was 11-37 years); median age of male smokers were 18 years (range of median age of male with acne *vulgaris* was 12-22 years). Median age of no-smoker people were 16 for female and 16 for male.

Smoking male were totally 4 and, of those, just 1 guy was affected by acne; smoking female, instead, were 12 and 11 of them had acne. Non smokers male were 94: 33 cases and 61 controls; non smokers female were 183: 48 cases and 135 controls.

Crude OR for the association between acne *vulgaris* and smoke was 7.26 (IC=2.27-23.18), while the adjusted OR for sex and age was 5.47 (IC=1.67-17.97).

From the clinical point of view, out of 93 cases, 6 had a severe grade of acne *vulgaris* (6.5%), 19 had an intermediate grade of acne *vulgaris* (20.4%), and 68 had a mild grade of acne *vulgaris* (73.1%). No one of the smokers had a severe grade of acne, only one smoker had an intermediate grade of acne *vulgaris* and 11 smokers had mild acne; anyway these differences are not statistically significant.

DISCUSSION

Tobacco is the most preventable cause of morbidity and death (1). In addition, it is involved in many skin disorders. Previous studies, concerning the association between acne vulgaris and smoke, showed contradictory results.

Acne *vulgaris* remains a rare disease in non-Westernized societies, but incidence rates of acne vulgaris have increased with the adoption of Western lifestyle, such as smoking habit (18).

According to some authors, smoking seems to exert an anti-inflammatory role in the pathogenesis of acne and tobacco appears to be protective in the development of this disease (14).

Other authors, instead, did not found any association between acne *vulgaris* and smoking (6, 7, 10).

A recent meta-analysis (19), examining only cross-sectional studies, underlines that there is not a significant evidence of the association between smoke and acne, neither as a risk factor, nor as protective factor: OR=1.05 (95% CI: 0.66–1.67). In the same study a not significant association by gender was observed: OR=1.45 (95% IC: 0.08-24.64) for female group, while for male group OR=0.99 (95% CI: 0.57–1.73) was found.

In our case-control study, the association between acne *vulgaris* and smoke shows an increased risk (OR=7.26) with a statistically significant Confidence Interval (95% CI: 2.27-23.18). Moreover, people ≥ 18 years of age have twice the risk compared to persons < 18 years of age (OR=2.31; 95% CI: 1.40-3.81).

The choice of this study design (case-control study) is really trustworthy, consenting to establish a temporal association between smoke and acne: is it possible to determine if subjects have developed acne before or after starting smoking, as it correlates the incident cases with the smoke exposure, that certainly come before the disease (acne).

Anyway, a limit of this study was to comprehend if the cumulative dose of nicotine got during the past years could still play a role in pathogenesis of acne; in addition, the distinction of ex-smokers and never smokers was not always clearly explained or even not reported.

TABLE 1

DESCRIPTION OF THE CASE-CONTROL STUDY				
VARIABLES	CASES (%)	CONTROLS (%)	OR (IC 95%)	OR ADJ* (IC 95%)
CURRENT SMOKERS	12 (12.9)	4 (2)	7.26 (2.27-23.18)	5.47 (1.67-17.97)
NO-SMOKERS (*)	81 (87.1)	196 (98)		
FEMALE	59 (63.4)	136 (68)	0.82 (0.49-1.37)	0.72 (0.42-1.24)
MALE (*)	34 (36.6)	64 (32)		
≥ 18 YEARS	50 (53.8)	67 (33.5)	2.31 (1.40-3.81)	2.01 (1.19-3.40)
‹ 18 YEARS (*)	43 (46.2)	133 (66.5)		

*Adjusted considering the model with the following variables: current smokers, gender, age

(*) Reference group

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