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Association between recurrent aphthous ulcers and tobacco habits

TONY AXÉLL AND VINCENT HENRICSSON

Department of Oral Surgery and Oral Medicine, Faculty of Odontology, Lund University, Malmö, Sweden

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Abstract - The study is a compilation of data on oral mucosal lesions collected among 20 333 people aged 15 yr and over. The aim was to calculate the correlation between the prevalence of recurrent aphthous ulcers and various tobacco habits. The prevalence of aphthous ulcers in the population was 17.7% including cases referring to episodes within the last 2 yr. There was a negative correlation between the prevalence of ulcers and tobacco habits. The suppression of ulcers was most evident for those groups smoking pipe or cigarettes without filter and only moderate for those using snuff. Further, heavy smokers had a lower frequency of ulcers than moderate smokers.

Key words: aphthous ulcer; epidemiology; oral; tobacco.

T. Axéll, Department of Oral Surgery and Oral Medicine, School of Dentistry, Carl Gustafs väg 34, S-214 21 Malmö, Sweden.

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In some previous reports it has been described how recurrent aphthous ulcers (RAU) have developed after patients have given up smoking and then disappeared on subsequent resumption of regular smoking (1, 2). In a study among students SHAPIRO *et al.* (3) found a weak, negative association between smoking and RAU.

The aim of the present study was to investigate if there is an association between RAU and different tobacco habits in a general population.

Material and methods

The study is a compilation of data on oral mucosal lesions collected by AXÉLL (4). A total of 20 333 people aged 15 yr and over, in urban, suburban and rural districts were examined. The representativity as regards the frequency of participation was 89.7% of the total population.

The clinical criteria for aphthous ulcers were: well-demarcated, rounded ulcers covered by a gray, white or yellowish fibrinous exudate and surrounded by a red, inflammatory zone.

Included in the study were also persons with a past history of RAU. The inclusion criteria were: a lesion of RAU as described by words and color prints was readily recognized by the patient who had suffered from the condition at least once during the last 2 yr. There was a past history of

recurrence and the healing time of each lesion had not exceeded 3 wk.

All persons answered a questionnaire on tobacco habits. Detailed information on the questionnaire is given in the publication by Axéll, pp. 90-91 (4). Assistance was given by trained personnel.

The question of validity and reliability is extremely important when it comes to registering histories of diseases or getting information from a questionnaire. An attempt to evaluate these parameters was carried out through the following procedures. Intraexaminer variability was estimated through reexamining 256 individuals. These persons were recalled for taking biopsies of various oral mucosal lesions. Out of 256 patients 25 answered that they had experienced episodes of RAU within the last 2 yr. The same number of patients, 25, gave the same answer at re-questioning. Out of these 25 patients, 21 answered positively on both occasions and four gave divergent information. The probability that a person answered positively on both occasions if they did in one of them was 0.72. As a comparison such probabilities for relatively easily recognizable lesions such as frictional white lesions and amalgam tattoos were 0.74 and 0.70, respectively.

Concerning the reliability of answers to questions on tobacco habits re-questioning was carried out. About 2 wk after the first questioning, 278 individuals were asked the same questions again. Out of 261 individuals who referred to unchanged tobacco habits and consumption, 252 (97%) gave the same and nine (3%) gave divergent information on the two occasions. In contrast, out of 17 individuals who referred to changed tobacco habits or consumption, four (24%) gave the same and 13 (76%) gave divergent information.

Differences between groups were calculated and evaluated by means of chi-square tests. For details on statistical methods see Axéll, pp. 33-36 (4).

Results

In total, at the clinical examination 456 persons showed aphthous ulcers corresponding to a prevalence of 2.00/0. A positive history of RAU was given by 3359 persons or 15.7%. Thus, altogether, 3815 persons or 17.7% suffered or had suffered from RAU.

Table 1

Number of people and frequencies of recurrent aphthous ulcer(s) RA(U) among individuals with different tobacco habits

Habit	With habit		With habit and RAU	
	n	%	n	%
1. Some tobacco habit	8048	39.6	1094	13.6
2. Smoking	6599	32.5	897	13.6
3. Cigarette smoking	5238	25.8	761	14.5
4. Moderate cigarette smoking*	3995	19.6	625	15.6
5. Heavy cigarette smoking**	1243	6.1	136	10.9
6. Cheroots	137	0.7	17	12.4
7. Pipe smoking	769	3.8	50	6.5
8. Moderate pipe smoking ⁺	505	2.5	31	6.1
9. Heavy pipe smoking ⁺⁺	264	1.3	19	7.2
10. Snuff dipping	877	4.3	132	15.0
11. No tobacco consumption	10757	52.9	2331	21.7

* 15 or less cigarettes a day

⁺ 50 g or less of tobacco a week

** >15 cigarettes a day

⁺⁺ > 50 g of tobacco a week

Chi-square values and P-values when testing between groups with various habits:

2-11 = 176.225 $P < 0.001$

3-7 = 36.992 $P < 0.001$

6-11 = 6.862 $P < 0.01$

4-5 = 16.888 $P < 0.001$

7-11 = 100.737 $P < 0.001$

8-9 = 0.319 NS

10-11 = 21.552 $P < 0.001$

3-10 = 0.144 NS

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during the past 2 yr. There was a slight
predominance among women ($P < 0.05$).

Some pertinent tobacco habits are shown
in Table 1. Some daily tobacco habit was
found among 39.6%, while 52.9% denied
any tobacco habit at all. Smoking was the
most common habit, especially cigarette
smoking. Heavy smoking (more than 15
cigarettes a day or 50 g pipe tobacco a week)
was comparatively infrequent.

In Table 1 frequencies of RAU are shown
for groups of people with various tobacco
habits. People with mixed habits are not
included. All groups practising any of the
listed tobacco habits showed lower frequen-
cies of RAU than non-tobacco users. Pipe
smoking seemed to give the most pronounced
reduction of ulcers. Further, the reduction
was more evident for heavy cigarette smokers
than for moderate smokers. This dose-depen-
dent suppression was not noted for pipe
smoking.

A separate calculation was carried out for
differences between frequencies for those
using cigarettes with filter and without. In
this calculation people with mixed habits
were included for technical reasons. There
was a statistically highly significant differ-
ence between the frequencies of RAU be-
tween these two groups, being 15.40/0 for
groups using cigarettes with filter and 8.1 %
for those using cigarettes without filters.
There was no frequency difference of RAU
between pipe smokers and smokers who used
cigarettes without filter ($P > 0.05$).

Discussion

The observation previously made by SHA-
PIRO *et al.* (3) that there is a negative associa-
tion between smoking and RAU, was con-
firmed in the present study. Further, there
seemed to be different qualities between
different tobacco habits regarding reduction
in the frequency of episodes. Pipe smoking
showed the most obvious reduction. Among
cigarette smokers the frequency of RAU

decreased at increase of consumption. Such a
dose-dependent reduction of frequency did
not appear when calculating differences be-
tween moderate and heavy pipe smokers.
This discrepancy could be at least partly due
to biologic inequality related to the arbitrar-
ily chosen limits for categorizing heavy and
moderate cigarette and pipe smokers.

The biologic mechanism behind the nega-
tive association between tobacco habits and
the frequency of RAU is not clear. SHAPIRO
et al. (3) has pointed to the possibility that
environmental, genetic, familial and psycho-
logic factors are important considerations
when discussing predisposing factors of re-
sistance, or lack of resistance to formation of
RAU. They suggest that multidisciplinary
longitudinal studies are needed if meaningful
data are to be obtained. However, they
mention the possibility that effects of the by-
products of combustion may be sufficient in
themselves to stimulate an increased kera-
tinization of the mucous membrane to resist
formation of RAU in the mouth. A negative
correlation between keratinization of the
oral mucosa and aphthae as seen, for in-
stance, in patients with leukoplakia has been
pointed out by BANCZY & SALLAY (5, 6).

The suppression of RAU from increased
keratinization could possibly be explained by
the fact that antigenic bacterial substances,
which have been mentioned as etiologic fac-
tors of RAU (7), are prevented from penetra-
ting through the epithelium and thus from
activating the immunologic system. A similar
inhibition of antigenic substances could be
exerted by the velvet-like, diffuse, edematous
film covering the non-keratinized mucosa,
the leukoedema. This in a previous paper,
based on the same material as the present
study, AXÉLL & HENRIKSSON (8) reported
that the frequency of leukoedema increased
among groups of people with various tobacco
habits and that pipe smokers showed the
highest frequency of clearly established
leukoedema.

In conclusion, the findings of the present

study strongly support the opinion that there is a negative association between tobacco habits and the frequency of RAU and, further, it also supports the hypothesis that surface structures, such as keratin and leukoedema, might prevent antigenic substances from penetrating the oral epithelium.

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