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Short Communication

Actinic Cheilitis among agricultural workers in Campinas, Brazil

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Objective To assess the prevalence of Actinic Cheilitis (AC) among agricultural workers and analyze its risk factors. ***Design*** A cross sectional epidemiological study. A lip lesion was defined as an abnormal change on the lip mucosa surface, such as erythematous pigmented, ulcerative or swelling (Cataldo and Doku, 1981). Data were gathered according to age group, gender, ethnicity, time and frequency of occupational sunlight exposure, smoking habits, drinking habits and socio-economic status. ***Setting*** Sugar-cane plantation farms in Brazil. ***Participants*** Full-time workers of both genders employed at sugar-cane plantation farms for at least six months. ***Outcome measures*** Correlations between AC prevalence, demographic and socioeconomic risk factors. ***Results*** 202 people were examined and the prevalence of AC was 39.6%. Results revealed that being black (0.15-0.88- 95%CI; OR=0.36; p=0.025) or mulatto (0.21-0.82- 95%CI; OR=0.42; p=0.011) decreased the risk for AC, while age and gender ~~sex~~ had no effect. In relation to socioeconomic variables, formal education and more than four years of education (0.07-0.68- 95%CI; OR=0.22; p=0.009) decreased the risk for AC. Moreover, drinking alcohol was a risk for AC (1.05-3.37- 95%CI; OR=1.88; p=0.034), while tobacco smoking was not (0.60-2.02- 95%CI; OR=1.10; p= 0.763). **Conclusions** The prevalence of AC is high in agricultural workers who were fairskinned, had low education and high alcohol intake. Prevention and early diagnosis are required for workers exposed to sunlight.

Key words: Actinic Cheilitis, epidemiology, lip, prevalence, risk factors.

Introduction

"Actinic cheilitis (AC) is a pre-malignant lesion that can transform into squamous cell carcinoma of the lip" (Cataldo and Doku, 1981, Rojas *et al*., 2004). It affects mainly the lower lip of fair skinned people excessively exposed to sunlight mainly in men aged between 40 and 80 years, living in rural areas or doing outdoor work. (Acquavella *et al*., 1998; Hakansson *et al*., 2001; Nordby *et al*., 2004; Ocana-Riola *et al*., 2004).

"Solar ultraviolet radiation (UV), known for its sun burning and immunomodulatory properties, has been recognized as the main etiological agent of actinic cheilitis" (Acquavella *et al*., 1998; Markopoulos *et al*., 2004, Rojas *et al*., 2004) and its action on DNA, challenging the genetic integrity of the cells, is well known (Massague, 2004). Markopoulos *et al*. (2004) observed that 66.2% of the patients with AC had an outdoor occupation. In outdoors workers in Sweden, Hakansson *et al*. (2001) found that the relative risk for lip cancer among a highly sun exposed group was estimated as 1.8 (95% CI=0.8-3.7). Nordby *et al*. (2004) found moderate associations of lip cancer and the agricultural population in male Norwegians that could be explained by solar exposure. Moreover, in Southern Spain, Ocana-Riola *et al*. (2004) found that areas with high intensive farming showed a significant increase in cancer risk for lip and other oral cancers. Similar information is not available in Brazil. The single study on AC prevalence in Brazil is in institutionalized elderly people and revealed that 2.6% had AC (Jorge Junior *et al*., 1991).

Other important factors in the aetiology of lip cancer include tobacco smoking, age and alcohol habits (Acquavella *et al*., 1998; Hakansson *et al*., 2001; Moore *et al*., 1999). However, it is unknown whether they are also involved in the pathogenesis of AC. Brazil is the greatest sugar and ethanol producer in the world and its production is around 34 million tons, involving US$ 2.5 billion of exportation annually, and a large number of outdoor workers are involved (Folha de Sao Paulo, 2006).

The aims of this survey were to assess the prevalence of AC in agricultural workers of Campinas, Brazil and analyze the role of behaviour, social and cultural factors in the prevalence of this lesion.

Materials and Methods

The total number of participants studied was 202; however for some workers age, ethnicity, smoking, education and drinking habits were not ascertained.

The present study protocol was approved by the Ethics Committee of the Institute of São Leopoldo Mandic Dental Research Center and informed consent was obtained from all participants.

The sample was recruited in the two sugar-cane plantation farms in Campinas city, southeast Brazil. In order to avoid selection bias all the 257 workers at the two farms were invited to participate in the study and none refused. The inclusion criteria was employed in the farms for at least six months, and having maximal probability for any sunlight exposure. Among 55 workers 45 were recently employed and 10 were not exposed to

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sunlight during their job. In total 202 participants were examined on the same day.

The oral health examinations were carried out by five well-trained and calibrated examiners. An initial group of eight examiners participated in theoretical and clinical training exercises and calibration for a total of 18 hours during six sessions. They were trained by two experienced researchers in carrying out clinical examinations for recording AC. A sample of 15 photographs that exhibited the full range of lip lesions expected to be assessed during the survey was used in the training and calibration exercise. Five final examiners were selected according to their intra and inter examiner agreement assessed by kappa values. Intra-examiner evaluation revealed substantial agreement, with Kappa values ranging from 0.84 to 0.86 and inter-examiner agreement revealed values, ranging from 0.73 to 0.77. A lip lesion was defined as any abnormal change on the lip mucosa surface, including heavy keratinization, erosion, ulceration, erythema or other pigmentation (Cataldo and Doku, 1981).

Data were gathered on the following participant's characteristics: 1) age group; 2) gender; 3) ethnicity 4) time and frequency of occupational sunlight exposure; 5) smoking habits 6) drinking habits and 7) socio-economic status. The specific measures used to assess the socio economic status were categories of schooling, crowded house, number of rooms in the house and house ownership.

Logistic regression models were used to assess the influence of the variables, age group, gender, ethnicity, sunlight exposure, smoking, drinking and social factors such as low educational level (less than four years in formal education) and number of people living in the same house. Odds ratios were calculated with 95% confidence intervals. Statistical significance was defined as $P< 0.05$. Cumulative occupational sunlight exposure was also examined. Calculations were performed using a statistical software package (SPSS Inc., Chicago, IL, USA).

Results

Among the 202 participants that were examined, the prevalence of AC was 39.6%. Sixty six individuals (32.7%) were 20-34 years old; 60 (29.7%) were 35-44 years old; 72 (35.7%) were 45-60 years old (Table 1). Four workers did not declare their age. The mean age was 39.9 (SD ±10.1). Of the 202 participants 166 (82.2%) were female and 36 (17.8%) were male.

Cumulative sunlight exposure for each occupational category was assessed during the interview and was es-

Table 1. Logistic regression for AC in relation to potential risk factors. Brazil.

Characteristics		*n total*	*n (%) with AC*	*OR*	*CI 95%*	*p*
Age	< 35 years	66	23 (34,8)	1,00		
	35 a 44 y	60	22 (36,7)	1,08	0,52 – 2,24	0,832
	45 years	72	35 (48,6)	1,77	0,89 – 3,51	0,103
Gender	Male	36	12 (33,3)	1,00		
	Female	166	68 (41,0)	1,39	0,65 – 2,96	0,397
Ethnicity	White	66	36 (54,5)	1,00		
	Oriental	13	5 (38,5)	0,52	0,15 – 1,76	0,294
	Mulatto	78	26 (33,3)	0,42	0,21 – 0,82	0,011
	Black	33	10 (30,3)	0,36	0,15 – 0,88	0,025
	Amerindian	2	0 (0,0)	-		
Occupational	No	2	1 (50,0)	1,00		
sunlight exposure	Yes	200	79 (39,5)	0,65	0,04 – 10,6	0,764
Smoking	No	75	33 (44,0)	1,00		
	Yes	95	44 (46,3)	1,10	0,60 – 2,02	0,763
Drinking Alcohol	No	90	29 (32,2)	1,00		
	Yes	106	50 (47,2)	1,88	1,05 – 3,37	0,034
School years	none	31	15 (48,4)	1,00		
	1 - 4 years	110	50 (45,5)	0,89	0,40 – 1,97	0,772
	> 4 years	35	6 (17,1)	0,22	0,07 – 0,68	0,009
N. people in the house	< 4	120	54 (45,0)	1,00		
	4≥	82	26 (31,7)	0,57	0,32 – 1,02	0,059
N. rooms in	< 4	123	47 (38,2)	1,00		
the house	4≥	77	32 (41,6)	1,15	0,64 – 2,06	0,638
House	owner	126	48 (38,1)	1,00		
	rent	44	19 (43,2)	1,24	0,62 – 2,48	0,553
	other	30	12 (40,0)	1,08	0,48 – 2,45	0,847

timated by assigning the average exposure period during the week. All workers were exposed to sunlight for 7 hours/day for a period of five days/week.

Multivariate logistic regression models were constructed to analyze the demographic (Table 1) and socioeconomic (Table 2) variables associated with probability of having AC. In relation to demographic characteristics, while age group and gender were not related as a potential risk factor for AC in the sample, being black (OR=0.36; p=0.025) or mulatto (OR=0.42; p=0.011) decreased the risk for AC (Table 1).

The results showed that smoking was not a risk factor (OR=1.10; p= 0.763). In contrast, drinking alcohol was a statistically significant risk factor for outdoor workers in our sample (OR=1.88; p=0.034).

There was only one socioeconomic status factor related to AC. A formal education more than four years decreased the risk for AC (OR=0.22; p=0.009).

Discussion

The results of this study have shown that skin type, alcohol consumption and education were risk factors associated with AC.

The prevalence of AC in agricultural workers excessively exposed to sunlight during working hours is high (39.6%), corroborating the statement that sunlight is the major risk factor for AC (Markopoulos *et al*., 2004). Actinic cheilitis (AC) is a pre-malignant lesion that can transform into squamous cell carcinoma of the lip, and chronic exposure to solar radiation is commonly cited as a major risk factor in the development of the lip cancer (Johnson and Warnakulasuriya, 1993; Moore *et al*., 1999). Therefore, the present findings support a hypothesis that employment in agriculture and farming is one of the major risk factors for lip cancer (Nordby *et al*., 2004; Ocana-Riola *et al*., 2004]. A meta-analysis study by Acquavella *et al*. (1998) concluded that lip cancer was clearly elevated among farmers.

Exposure to sun radiation may generate energy released by free oxygen radicals that can break the phosphodiester bonds in the backbone of the DNA helix. The cell will then face a particularly challenging situation for repair, and highly conserved DNA-repair and cell-cycle checkpoint pathways allow cells to deal with sources of DNA damage. A damage to cellular DNA causes cancer. (Kastan and Bartek, 2004).

In our sample, skin type was an important factor and white skin increased the probability of having AC. The protective effects of natural skin pigment melanin against the carcinogenic action of ultraviolet radiation (Johnson and Warnakulasuriya, 1993) explain the lower prevalence of AC in black and mulatto people.

In our sample, drinking habits proved to be a risk factor for AC, as demonstrated by Campisi and Margiotta (2001). The exact mechanisms by which alcohol habits stimulate carcinogenesis are not known. Ethanol is a cocarcinogen and/or tumour promoter. The metabolism of ethanol leads to acetaldehyde generation and free radicals. “Acetaldehyde is both carcinogenic and mutagenic, binds to DNA and proteins, destructs folate and results in secondary hyperproliferation”. “Other mechanisms by which alcohol stimulates carcinogenesis include the induction of cytochrome P-4502E1” (Pöschl and Seitz, 2004), which is associated with increased production of free radicals and enhanced activation of various procarcinogens present in alcoholic beverages. It also triggers change in the metabolism and distribution of carcinogens; as well as alterations in cell cycle behaviour such as cell cycle duration leading to hyperproliferation and alterations of the immune system. “In addition, local mechanisms may be of particular importance” (Pöschl and Seitz, 2004). For a detailed review, refer to Pöschl and Seitz (2004).

The results of this study reveal that socio-economic status is also a risk factor for AC among Brazilian outdoor workers, as in Southern Spain (Ocana-Riola *et al*., 2004). Workers who had had access to formal education and studied more than four years at primary school in Brazil had less chance of having AC. Therefore, it confirms the fact that the higher the educational level, the lower the prevalence for disease (Pincus *et al*., 1998).

Other factors such as gender age, tobacco smoking and other socio-economic status were not related with AC in this population. Even though the prevalence was not significantly related to gender among agricultural workers in Campinas, it is well known that females tend to have a much lower incidence of lip cancer, perhaps due to the protective effects of cosmetics (Pogoda and Preston-Martin, 1996).

Actinic cheilitis can undergo malignant transformation into squamous cell carcinoma (Main and Pavone, 1994), however, it can be minimized by the use of an appropriate sunscreen when outdoors.

This study has provided information on epidemiological aspects of AC, which may prove valuable in planning future oral health studies and implementing preventive programs and public health policies for these outdoor workers, like increased use of sunscreens for those who really need to work exposed to sunlight, as well as a change in drinking habits.

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High Court rejects anti-fluoridation case

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A significant legal judgment was delivered in the High Court on 11th February 2011 when Mr Justice Holman dismissed a claim by Geraldine Milner, an anti-fluoridation resident of Southampton, that a decision taken in February 2009 by South Central Strategic Health Authority (SHA) to add fluoride to the city's water supply had been unlawful.

Implementation of the disputed scheme, which aims to fluoridate water supplies to 195,000 people in Southampton and neighbouring areas of Hampshire, has been held up for two years pending the outcome of the case.

Ms Milner argued that South Central SHA had ignored what she alleged was a government policy that no new fluoridation schemes should proceed without the support a majority of local people. But the judge said it was not clear that such a policy existed and, even if it had existed (which he did not accept), it would have been inconsistent with the relevant regulations approved by Parliament and subsequent guidance issued by the Chief Dental Officer.

Secondly, Ms Milner argued that the SHA had failed properly to assess the cogency of the arguments against fluoridation made by respondents to the consultation. This was dismissed by Mr Justice Holman, who said her claim was not even arguable.

In conclusion, Mr Justice Holman said the SHA had not acted unlawfully and no court could interfere with its decision. He also offered guidance to any SHA about making post-consultation decisions on fluoridation under the current legislation:

1. They need to ascertain and make a judgement or assessment as to the cogency of all the arguments (not merely the health arguments) advanced both for and against proceeding with the proposal.
2. They need to weigh very carefully those arguments which are health arguments in favour of proceeding against all the arguments (not merely any health arguments) against proceeding.
3. If they are not satisfied that the health arguments (and none other) in favour outweigh all the arguments against, then that is the end of the matter.
4. If they are satisfied that the health arguments in favour do outweigh all the arguments against, they then need to have regard to the extent of support for, or opposition to, the proposal, and decide whether, in the light of the extent of support/opposition, the health arguments in favour are still so weighty that they should prevail.

Good advice perhaps. But SHAs are due to be abolished at the end of March 2012 under the coalition government's proposals to restructure the NHS. If current indications are correct, and subject to Parliamentary approval, the responsibility for conducting fluoridation consultations is likely to shift to local authorities.

Up to 1974, local authorities used to be responsible for fluoridation. Indeed, over half the estimated 5.5 million people in England currently benefiting from water fluoridation schemes are doing so thanks to decisions made by councils such as Birmingham, Newcastle-upon-Tyne, Warwickshire and Cheshire.

For the sake of dental public health, let us hope that if and when local authorities take back the responsibilities they used to hold, they will ensure the expansion of fluoridation in parts of the country with the highest rates of tooth decay.

To view and download a copy of the full judgment see www.southcentral.nhs.uk/11/02/2011/ fluoridation-judicial-review-decision

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