ORIGINAL ARTICLE

Prevalence and factors associated to actinic cheilitis in beach workers

EE de Souza Lucena[1], DCB Costa[2], EJD da Silveira[3], KC Lima[3]

[1]*Department of Dentistry at the State University of Rio Grande do Norte, Caicó, Brazil;* [2]*Department of Dentistry at the Federal University of Rio Grande do Norte, Natal, Brazil;* [3]*Department of dentistry at the federal University of Rio Grande do Norte, Natal, Brazil*

OBJECTIVES: Assess the prevalence and potential factors associated to actinic cheilitis (AC) in workers exposed to the sun.
MATERIALS AND METHODS: Workers assigned to urban beaches in a city in Northeastern Brazil completed a questionnaire containing personal and health data. Lips were examined to identify AC.
RESULTS: A total of 362 workers, of which 15.5% exhibited AC, were examined. Among those with AC, there was a prevalence of males (86%), aged 37 years or older (61.4%) and light-skinned (52.6%). They were undocumented (96.5%), exposed to the sun (84.2%), worked up to 6 h daily (57.9%), five or more times per week (52.6%), and for more than 8 years (54.4%). Photoprotection was used by 89.5%, including sunscreen (42.0%), lip protector (17.5%), and cap/hat (87.7%). Approximately 30% smoked and 29.8% consumed alcohol, 56.2% over two standard shots per day. Most (91.2%) ate healthy food five or more times per week. Being male, aged 37 years or older, having up to 6 years of schooling, being light-skinned, wearing a cap/hat, and using sunscreen were factors associated to AC.
CONCLUSION: A high prevalence of actinic AC was observed. Special attention should be given to individuals chronically exposed to UV radiation, with the institution of educational, preventive, and curative measures.
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Keywords: actinic cheilitis; prevalence studies; ultraviolet radiation

Introduction

Actinic cheilitis (AC) is a potentially cancerous lip lesion that has been indicated as a risk factor for lip squamous cell carcinoma (Domaneschi *et al*, 2003; Markopoulos *et al*, 2004; Rojas *et al*, 2004). It is clinically characterized as acute AC and chronic AC. In less common acute cheilitis, present in those exposed regularly and excessively to sunlight, lips appear red, exhibiting edema, forming blisters and bubbles followed by crusting. The lesion regresses when the etiologic agent is interrupted. Chronic cheilitis, common in individuals chronically exposed to ultra violet (UV) radiation, is clinically characterized by atrophy of the red part of the lower lip, with loss of elasticity, and keratotic plaques ranging from thin to thick, rough and scaly, overlapping irregular erythematous areas, in addition to ulcers and fissures. A relevant aspect is the loss of a clear separation between the labial semimucosa and the skin (Markopoulos *et al*, 2004; Cavalcante *et al*, 2008; Piñera-Marques *et al*, 2010).

This lesion occurs predominantly in middle-aged, light-skinned men excessively or chronically exposed to ultraviolet radiation, such as those who work outdoors or spend considerable time in the sun. The most common anatomical site for AC is the lower lip, owing to higher exposure to solar radiation (Markopoulos *et al*, 2004; Corso *et al*, 2006; Silva *et al*, 2006; Cavalcante *et al*, 2008; Pukkala *et al*, 2009).

The prevalence ranges from 0.45 to 2.4% of the population (Corso *et al*, 2006; Henrique *et al*, 2009). In the studies that investigated populations that were engaged in outdoor activities, the prevalence varied between 4.2 and 43.2% (Zanetti *et al*, 2009).

The incidence of harmful UVB rays is greater in tropical countries, with Brazil exhibiting the highest UV ray levels in the world (Kirchhoff *et al*, 2000). This favors the development of oral and perioral lesions, such as skin cancer, actinic cheilitis, and epidermoid carcinoma of the lip (Silva *et al*, 2006). It is important that the population be aware of these conditions, especially individuals exposed to the sun and those who work at the beaches. In light of these aspects, the aim of this study was to assess the prevalence of AC in workers exposed to the sun at the municipal beaches in Natal, Brazil, in 2010, in addition to investigate the potential associations with individual, occupational, and health cofactors, such as gender, skin type, accumulated sun exposure, use of photoprotection measures, nutrition, and habits.

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Materials and methods

Workers at five urban beaches in Natal, capital of Rio Grande do Norte state, were allocated by convenience sampling on August 28 and 29 and December 11 and 12, 2010. After giving their informed consent, subjects completed previously a questionnaire, containing information pertaining to personal, employment, and health data. This instrument was made in three steps. The first was conducted through literature search, followed by an evaluation by dentists, dermatologists, and epidemiologists, and finally a cultural adaptation of the questionnaire to the universe of the study.

Following completion of the questionnaire, clinical examinations of the labial region were performed by previously calibrated evaluators, using inspection and palpation techniques, with the help of loupes and direct light. Cameras were used to improve the visibility by zoom feature to confirm diagnostic. During the clinical examination, the following were considered: dryness, atrophy, scaly lesions, swelling of the lip, erythema, ulceration, blurred demarcation between the lip vermilion border and the skin, marked folds along the lip vermilion, white spots or plaques, crusts, blotchy areas, areas of pallor, and such as burning or itching (Cavalcante *et al*, 2008) (Figure 1). A workshop calibration was made by the teachers of the Department of Dentistry and Department of Dermatologist to minimize variations among different examiners. The result of the calibration process, measured by the kappa coefficient, ranged from 0.68 to 1.00. Thus, eight students potentially calibrated of the course of dentistry were responsible for the diagnosis of lip lesions and four students of medicine for the perioral lesions.

The research project was approved by the Research Ethics Committee of the Federal University of Rio Grande do Norte (protocol no. 122/09).

The sample was composed of adults of both genders, directly and/or indirectly exposed to the sun. A pilot study was first conducted with 10% of the sample universe, owing to the absence of estimates regarding

the number of workers, which compromised calculation of actual sample size. Two evaluators went to the collection sites over 2 weekends and observed 1200 workers, resulting in a sample of 120 individuals. Based on the prevalence of lip lesions obtained in the pilot study (36.6%), and considering a margin of error of 15% and non-response rate of 20%, a final sample of 286 individuals was obtained. The methods to the pilot study were the same from the main study.

Independent personal and employment variables analyzed, all obtained from the completed questionnaire, were age, gender, income in dollars, schooling level (personal), main occupation, employment status (union or non-union staff), weekly sun exposure, daily sun exposure, accumulated sun exposure, and photoprotection measures (sunscreen, lip protector, cap/hat, lipstick, and others).

Health data were also collected, such as habits (smoking and alcohol consumption), classified as number of cigarettes smoked in the previous 30 days and consumption of standard shots of alcohol, categorized as one shot in the previous 30 days or more than two standard shots per day. One standard dose was defined as half a bottle (300 ml) or one can of beer, one glass of wine, or a shot of spirits, according to criteria adopted by the Ministry of Health (2004). The consumption of healthy foods, such as fruits, vegetables, and greens, that play a protection role in the development of not transmitted diseases according to the Brazilian Ministry of Health was also studied. Skin type was classified according to Fitzpatrick's scale (Fitzpatrick, 1988). Presence/absence of AC was the dependent variable.

Data were imported to STATA 10.0 software (StataCorp, College Station, TX, USA). Next, descriptive analyses of all dependent and independent variable data were carried out, in addition to chi-square tests, prevalence ratios, and respective confidence intervals. A significance level of 5% was set for all tests. Multivariate analysis was conducted using robust Poisson regression and a hybrid parameter method to estimate prevalence ratios of AC, adjusted for years of schooling, age, use of cap/hat, and skin type.

Results

After data collection, results for the 362 workers were included. Sociodemographic data are illustrated in Table 1. It was observed that most of the sample were men (72.6%), aged around 40 years, with mean monthly income of US$ 307.00 and an average of 6 years of schooling. Non-union workers had been directly exposed to the sun for 6 h a day, 5 days a week for the previous 8 years. The vast majority used some type of photoprotection (80.1%), such as a cap/hat (66.2%) and sunscreen (41.6%). With respect to habits, one-quarter of the sample (24.9%) smoke, more than half (59.9%) do not drink, and most consume healthy food five or more times a week (83.7%), including fruits and vegetables (69.6%). In relation to skin type based on Fitzpatrick's scale, workers with light brown skin (35.5%) and dark brown skin (30.4%) predominated.

Figure 1 Clinical features of AC showing areas with atrophy, erythema and blurred demarcation between the lip vermilion border and the skin. Natal, Brazil, 2010

Table 1 Sample description according to sociodemographic and occupational variables. Natal, Brazil, 2010

		Variable				
	n	Mean ± SD	Median	Q 25–75	Min.	Max
Sociodemographic						
Age	355	37.17 ± 11.88	37.00	27.00–45.00	18.00	68.00
Years of schooling	355	6.49 ± 3.98	6.00	4.00–10.00	0	17.00
Income in dollars	337	428.76 ± 298.70	318.75	250.00–500.00	31.25	2625.00
Occupations						
Start time (years)	361	8.62 ± 1.37	9	8.00–10.00	5.00	13.00
End time (years)	361	15.84 ± 1.98	16.00	14.00–17.00	8.00	24.00
Daily sun exposure time in hours	361	5.89 ± 1.26	6.00	7.00–6.00	0	7.00
Weekly sun exposure in days	361	4.76 ± 2.17	5.00	2.50–7.00	1.00	7.00
Exposure in years	361	10.07 ± 9.66	8.00	3.00–15.00	1/12	60.00
Exposure in months	361	121.27 ± 115.60	96.00	180.00–36.00	1.00	720.00

Of the workers examined, 56 (15.5%) were diagnosed with AC. Sociodemographic data are shown in Table 2. There was a prevalence of men (86%), with ages above the sample mean and light skin (52.6%). 84.2% are directly exposed to the sun, and 96.5% are undocumented. Individuals with AC had more accumulated sun exposure compared to the total sample (Table 2).

Socioeconomic variables revealed that individuals with AC had low schooling levels and income below the sample mean (Table 2).

Most workers reported using photoprotection, consisting mainly of wearing a cap/hat (87.7%). However, 57.9% and 82.5% do not use sunscreen and lip protector, respectively.

Only one-third of the subjects smoked and half consumed alcoholic beverages, 55.6% of whom drink over two standard doses per day.

With respect to consumption of food, 91.2% of workers usually ate healthy foods five or more times per week, primarily fruits or vegetables (66.7%).

However, a correlation between these socioeconomic, employment, and overall health data and the presence of AC (Table 3) demonstrated that men had 2.3 times more AC than women. Individuals aged 37 years or older exhibited 1.9 times more AC than their younger counterparts, and light-skinned subjects had 2.3 times more than those with dark brown/black skin. Those that did not wear a cap/hat had a protection factor of 72% against developing AC.

In the multivariate analysis model, all previously analyzed variables were significant. However, in this case, individuals aged 37 years or older exhibited 2.2 times more AC than those with dark brown/black skin. Years of schooling and use of sunscreen, neither significant in bivariate analysis, became more significant in multivariate analysis. Individuals with up to 6 years of schooling had 1.7 times more AC than those with more than 6 years, and those that used sunscreen had a protection factor of 66% against developing AC.

Discussion

As observed in the present study, men predominate in these professions, and most are poorly educated and economically underprivileged. This larger incidence of men is owing to greater endurance and physical vigor in performing these activities, which do not require schooling. However, incomes are low, leading to precarious living conditions.

These socioeconomic characteristics illustrate the scant importance given to self-care and harmful health habits, in addition to unawareness of oral diseases. According to Camargo *et al* (2009), individuals with less schooling and lower economic levels make fewer visits to the dentist. As such, they do not have the opportunity to address these problems individually during dental consultations. An important finding was observed in a study conducted by Piñera-Marques *et al* (2010), where only 2% of fishermen were aware of the potential malignant transformation of their lip lesions.

Thus, the prevalence of AC in these populations is elevated (Campisi and Margiotta, 2001; Silva *et al*, 2006;

Table 2 Description of population with actinic cheilitis according to sociodemographic and occupational variables. Natal, Brazil

		Variable				
	n	Mean ± SD	Median	Q 25–75	Min.	Max
Sociodemographic						
Age	55	43.09 ± 11.80	44.00	35.00–50.00	19.00	65.00
Years of schooling	55	5.53 ± 4.18	5.00	1.00–9.00	0	15.00
Income in dollars	54	464.81 ± 274.47	375.00	287.75–640.62	31.25	1250.00
Occupational						
Daily sun exposure time in hours	57	5.88 ± 1.23	6.00	5.00–7.00	3.00	7.00
Weekly sun exposure in days	57	4.96 ± 2.02	6.00	3.00–7.00	1.00	7.00
Exposure in years	57	13.12 ± 12.07	10.00	3.50–20.00	1/12	48.00
Exposure in months	57	157.49 ± 144.83	120.00	42.00–240.00	1.00	576.00

Table 3 Frequencies, χ^2 test, *P*-value, PRs and respective confidence intervals for the presence of actinic cheilitis associated to sociodemographic, occupational and overall health variables. Natal, Brazil, 2010

					Presence of actinic cheilitis				
Variable	n	%	χ^2	P-value	*PRnaj*	*CI (95%)*	*PRaj*	P-value	*CI (95%)*
Gender									
Male	49	18.6	5.266	0.022	2.306	(1.133–4.693)	–	–	–
Female	8	8.1							
Age									
37 years and older	35	20.6	5.743	0.017	1.904	(1.145–3.166)	2.205	0.027	1.0944.445
Up to 37 years	20	10.8							
Years of schooling									
Up to 6 years	34	17.9	1.428	0.232	1.406	(0.851–2.324)	1.767	0.031	1.053–2.965
6 years or more	21	12.7							
Income in dollars									
Up to 318.75	22	12.8	2.260	0.098	0.660	(0.400–1.086)	–	–	–
318.75 or more	32	19.4							
Type of work									
Outdoor	48	15.1	0.482	0.488	0.738	(0.390–1.397)	–	–	–
Indoor	9	20.5							
Daily exposure									
6 ho or more	24	15.6	0.001	1.000	0.978	(0.603–1.584)	–	–	–
Up to 6 h	33	15.9							
Weekly exposure									
5 days or more	30	16.8	0.127	0.721	1.130	(0.701–1.821)	–	–	–
Up to 5 days	27	14.8							
Accumulated exposure									
8 years or more	26	13.1	2.039	0.153	0.683	(0.423–1.101)	–	–	–
Up to 8 years	31	19.1							
Photoprotection									
No	6	8.3	3.058	0.080	0.474	(0.212–1.060)	–	–	–
Yes	51	17.6							
Use of sunscreen									
No	33	15.6	0.001	1.000	0.977	(0.603–1.583)	0.340	0.010	0.1500.770
Yes	24	16.0							
Use of cap/hat									
No	7	5.7	16.138	0.001	0.274	(0.128–0.587)	–	–	–
Yes	50	20.9							
Use of lip protector									
No	47	15.2	0.281	0.596	0.791	(0.427–1.465)	–	–	–
Yes	10	19.2							
Type of skin									
Light	30	26.1	11.983	0.001	2.348	(1.467–3.757)	2.349	0.001	1.4613.774
Dark Brown/Black	27	11.1							
Habit									
Yes	32	17.5	0.601	0.438	1.252	(0.774–2.025)	–	–	–
No	25	14.0							
Alcohol consumption									
Yes	27	18.6	1.167	0.280	1.347	(0.837–2.167)	–	–	–
No	30	13.8							
Smoking									
Yes	17	18.9	0.604	0.437	1.284	(0.767–2.150)	–	–	–
No	40	14.7							

Zanetti *et al*, 2009). In 2001, Camposi and Margiotta diagnosed potentially malignant lesions in 118 inhabitants of a Mediterranean island, observing AC in 5 (4.2%) of the individuals. A significantly higher prevalence was found in a study by Silva *et al* (2006), who examined 111 fishermen from fishing communities in Florianopolis, Brazil, diagnosing 48 cases (43.24%) of AC. Zanetti *et al* (2009) recorded AC prevalence comparable to the present study (15.7%), in a health campaign in Campinas, Brazil, in 2005, where they diagnosed AC in 18.1% of the 420 individuals examined.

Similar to literature data, a statistically significant relationship was observed between the presence of this labial alteration and male gender, age above 37 years and light skin. Association with men is believed to be owing to their greater presence in activities involving sun exposure, in addition to the lack of self-care, leading to more lesions.

Actinic cheilitis, a potentially cancerous lesion, results from chronic exposure to solar radiation, especially UVB rays. In relation to low socioeconomic status, it was found that the lower the schooling level of individuals, the greater the likelihood of their developing lesions, in contrast to the findings of Camargo *et al* (2009).

Thus, there is a cumulative effect of these aggressions, and the older the individual, the greater the probability of their developing AC. Despite investigating data

related to habits, food consumption, and accumulated sun exposure, no relationship was observed between them and the presence of AC, in contrast to Campisi and Margiotta (2001), who found a statistically significant association ($P < 0.05$) between the presence of AC and personal habits (smoking and alcohol consumption). An exception to predisposing factors was socioeconomic status, especially years of schooling, corroborating Camargo et al (2009).

Lips are more susceptible to radiation because of their thin epithelial thickness and, keratin layer, less melanin protection, and scarce secretions of sebaceous and sweat glands (Kaugars et al, 1999; Markopoulos et al, 2004). White individuals exhibit melanocytes with reduced activity, small melanosomes, and a smaller amount of melanin, resulting in greater radiation absorption by the skin (Halder and Bridgeman-Shah, 1995; Gloster and Neal, 2006). As such, light-skinned individuals are more prone to develop AC.

As in Silva et al (2006), the present study found no significant association between the presence of photoprotection and the occurrence of cheilitis. However, a statistically significant relationship was observed between AC and the use of sunscreen and cap/hat, that is, those using these photoprotection measures were more likely to develop AC. In this case, we must consider that caps/hats, especially those with small brims used by most of the subjects, are effective only for the upper and middle third of the face, favoring the direct incidence of UV rays on the lips. Nevertheless, workers believe they are protected against radiation, disregarding the importance of using sunscreen and lip protector, whose use was observed in only 42.7% and 17.5% of individuals with AC, respectively.

This negligence, in terms of both sunscreen and lip photoprotection, reflects the lack of knowledge on the part of workers about the harmful effects of UV radiation, demonstrating the need to introduce intensified preventive measures for this population. This may also be owing to the undocumented status of these individuals (96.5%). In 2009, 552/09 law was introduced to amend labor laws, benefiting outdoor workers by limiting work hours, increasing rest breaks, and entitling employees subjected to solar radiation to extra remuneration. Companies have adhered to preventive measures, thereby favoring many documented workers (Brazil, 2009).

This study aimed at contributing to a deeper understanding on the part of health professionals, the scientific community, and health authorities regarding the epidemiological aspects of AC, especially the harmful effects of UV radiation, mainly for those subjected to intense and chronic exposure. It is important to intensify educational and preventive measures, as well as ensure suitable curative actions for this population.

Author contributions

EE Lucena de Souza participated in the steps of data analysis, construction and final editing of the text. DCB Costa was responsible for data analysis and editing of the text. EJD da Silveira and KC Lima were responsible for the design of the study, drafted the sampling design, participated in data analysis and final draft of the text.

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