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# Prevalence and factors associated with orolabial lesions in beach workers

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## ABSTRACT

**OBJECTIVE:** To assess the prevalence and factors associated with orolabial lesions caused by sun exposure in beach workers.

**METHODS:** Cross-sectional study with 362 beach workers from five urban beaches in the city of Natal, northeastern Brazil, from August to December 2010. All subjects completed a validated questionnaire to collect personal, occupational, and health-related information and underwent an orolabial clinical examination by trained examiners. Potential associations between sociodemographic, occupational, and health-related variables and the presence of orolabial lesions were assessed using the chi-square test at a 5% significance level. The multivariate analysis was performed using Poisson regression.

**RESULTS:** Of the 362 workers examined, 27.1% had orolabial lesions. Of these, 76.8% were males, 61.6% dark or black skinned, 94.5% informal workers, and 85.4% reported sun exposure. Most (81.1%) reported using sun protection methods including sunscreen (38.7%), lip balm (15.3%), and cap/hat (72.4%). Twenty-eight percent reported smoking and 48% regular drinking. Sun protection with cap/hat was associated with orolabial lesions caused by sun exposure.

**CONCLUSIONS:** There was found a high prevalence of orolabial lesions in workers exposed to sunlight that was associated with the use of a cap/hat as a sun protection method.

**DESCRIPTORS:** Lip Diseases, epidemiology. Occupational Exposure. Ultraviolet Rays, adverse effects. Bathing Beaches. Occupational Health.

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Received: 11/19/2011

Approved: 6/10/2012

Article available from: [www.scielo.br/rsp](http://www.scielo.br/rsp)

## INTRODUCTION

Occupational exposure to the sun has been related to some types of skin and lip diseases.<sup>1,9,20</sup> Repeated and prolonged exposure to the sun over decades can result in changes in the skin and the development of potentially malignant lesions.<sup>21,a,b</sup>

Even with the huge volume of data and studies on lesions to the mucous membrane of the lip due to sun exposure, the pathogenesis of this disease is still not clear. There is a consensus that its development is not a simple process. The natural history of this disease is the result of various intrinsic and extrinsic risk factors to human beings, which act independently, antagonistically or in synergy to produce, or not, alterations in the skin. Potentially malignant lesions may develop into invasive cancers as the result of long, repeated and intermittent exposure to these risk factors.

Workers of various occupational groups are more susceptible to photodamage. Those who work in the open air can receive doses of UV radiation six to eight times greater than those who work indoors.<sup>12</sup> Consequently, they are more subject to the appearance of lesions on their skin and lips. "Outdoor workers" are associated with greater risk of being affected by squamous cell carcinoma and possibly other forms of skin cancer.<sup>6,7,10,14,19</sup> This epidemiological knowledge is not sufficiently exploited as a base for occupational health preventative programmes in the workplace.<sup>12</sup>

The need to understand and analyse factors related to developing the disease requires to knowledge of the socio-economic, environmental and political conditions which determine the health-disease process of a given community. Instead of considering only etiological factors and risks, which are restricted to biological aspects of an individual character, studies should focus on the determining characteristics of the groups.<sup>13</sup>

This study aims to analyse the prevalence of lip sores due to sun exposure in beach workers and the associated factors.

## METHODS

This was a transversal study with 362 beach workers from five urban beaches in the municipality of Natal, RN, Northeast Brazil, which took place between August and December 2010. The workers responded to a previously validated questionnaire with information about their personal details, their occupation and their health.

The validation process was comprised of three stages: validation of content based on the literature;

bibliographical research regarding the presentation of the variables in the research; questionnaire sent to stomatologists, dermatologists and epidemiologists who analysed whether the questions were consistent with the objectives of the study. If there were inconsistencies, they were able to make recommendations or suggest alterations. The instrument was culturally adapted to the universe of the study. In the two weeks before the research took place, as part of the validation process, beach workers were questioned as to their understanding of the questionnaire.

The workers underwent clinical exams of the upper and lower lip in a clockwise direction, carried out by trained researchers. Cameras were used to magnify images in order to improve the visibility of the lips and confirm diagnosis. The clinical exam considered: dryness, atrophy, scaly lesions, lip swelling, erythema, ulceration, blurred demarcation between the lip and the surrounding skin, marked creases around the lips, white marks, scabs, stained or pale areas.

Professors from the Department of Dentistry and Dermatology of the Universidade Federal do Rio Grande do Norte were enlisted to train the field workers in order to ensure uniform and consistent interpretation of the standard criteria for collecting data. These instructors gave workshops to train the examiners. The result of the training process, measured by the kappa coefficient, varied between 0.68 and 1.00. Eight students from the dentistry course were responsible for diagnosing lip lesions.

The sample was made up of adults of both sexes who were directly and indirectly exposed to the sun. A pilot study was carried out, due to lack of quantitative estimates of the number of people who worked on the beaches. Two researchers went to the data collection locations on two weekends and observed 1,200 individuals working in the areas involved in the study. A sample of 120 people (10% of the universe) was selected for the pilot study. The sample came to be 355 individuals based on the prevalence of lip lesions (36.6%) verified in the pilot study, considering a margin of error of 15% and a 20% no-response rate.

The independent variables analysed were: sex, age, income (in R\$), level of education, type of work, weekly frequency of exposure to the sun, time exposed to the sun daily, accumulated time exposed to the sun and measures taken to protect themselves from the sun on an occupational level.

<sup>a</sup> Ministério da Saúde (BR), Instituto Nacional do Câncer. Estimativas da incidência e mortalidade por câncer no Brasil para 2010. Rio de Janeiro: INCA; 2009.

<sup>b</sup> Sociedade Brasileira de Dermatologia. Campanha Nacional de Prevenção contra o Câncer de Pele [cited 2011 feb]. Available from: <http://sbd.tempsite.ws/capele/gestao/relatorios.asp?campanha=1>

Data was collected on health, habits (alcohol and tobacco consumption) and skin type according to the classification by Fitzpatrick.<sup>11</sup> The dependent variable of the study was the presence of skin lesions.

The data collected was inputted into STATA 10.0 software. We carried out descriptive analysis on all the data relative to the dependent and independent variables, Chi-squared statistical tests and calculated prevalence ratios and the respective confidence intervals. The multiple analysis was carried out using robust Poisson regression for the parameter of the hybrid method to estimate the prevalence ratios for lip lesions adjusted for sex, age, type of work, measures taken to protect from the sun, using lip balm with SPF, using a hat/cap, skin type and tobacco and alcohol consumption. A level of significance of 5% was adopted for all of the tests.

The participants all signed consent forms. This research was approved by the Ethical Research Committee of the Universidade Federal do Rio Grande do Norte (Protocol n° 122/09).

## RESULTS

The majority of the workers were male (72.6%), approximately 40 years old, with an average monthly income of \$ 510.00 (US\$ 245.19) and had on average spent six years in the education system. They had been working outdoors, directly exposed to the sun for six hours a day, five days a week for eight years (Table 1).

Among those individuals diagnosed with lip lesions, the majority (76.8%) were men and were older than the mean age of the sample. Those with lip lesions had low levels of education and an average income similar to that of the sample; 85.4% worked in direct exposure to the sun; 94.5% were casual workers and had accumulated and daily times exposed to the sun similar to the total study population (Table 2).

The greater part of the workers reported using solar protection, but we observed that 61.3% and 84.7% respectively did not use sun cream or lip balm with SPF. Approximately a quarter of the sample smoked and 40.1% consumed alcoholic beverages.

**Table 1.** Description of the sample according to sociodemographic and occupational variables. Natal, Northeast Brazil, 2010.

| Variable                           | n   | Mean  | sd    | Median | Q 25-75       | Min   | Max      |
|------------------------------------|-----|-------|-------|--------|---------------|-------|----------|
| Sociodemographic                   |     |       |       |        |               |       |          |
| Age                                | 355 | 37.8  | 11.9  | 37.00  | 27.00-45.00   | 18.00 | 68.00    |
| Years in the education system      | 355 | 6.5   | 4.0   | 6.00   | 4.00-10.00    | 0     | 17.00    |
| Income in R\$                      | 337 | 686.0 | 477.9 | 510.00 | 400.00-800.00 | 50.00 | 4.200.00 |
| Occupational                       |     |       |       |        |               |       |          |
| Initial time                       | 361 | 8.6   | 1.4   | 9.00   | 8.00-10.00    | 5.00  | 13.00    |
| Final time                         | 361 | 15.8  | 2.0   | 16.00  | 14.00-17.00   | 8.00  | 24.00    |
| Daily exposure time in hours       | 361 | 5.9   | 1.2   | 6.00   | 7.00-6.00     | 0     | 7.00     |
| Weekly exposure to the sun in days | 361 | 4.7   | 2.2   | 5.00   | 2.50-7.00     | 1.00  | 7.00     |
| Exposure in years                  | 361 | 10.1  | 9.7   | 8.00   | 3.00-15.00    | 0.08  | 60.00    |
| Exposure in months                 | 361 | 121.3 | 115.6 | 96.00  | 36.00-180.00  | 1.00  | 720.00   |

**Table 2.** Description of the population diagnosed with some kind of lip lesion according to sociodemographic and occupational variables. Natal, Northeast Brazil, 2010.

| Variable                           | n   | Mean          | sd    | Median | Q 25-75       | Min   | Max      |
|------------------------------------|-----|---------------|-------|--------|---------------|-------|----------|
| Sociodemographic                   |     |               |       |        |               |       |          |
| Age                                | 162 | 39.1          | 11.5  | 39.00  | 30.00-47.00   | 18.00 | 65.00    |
| Years in the education system      | 160 | 6.1 (4.9)     | 4.9   | 5.00   | 3.00-10.00    | 0     | 16.00    |
| Income in R\$                      | 151 | 674.2 (436.8) | 436.8 | 510.00 | 400.00-800.00 | 50.00 | 2,500.00 |
| Occupational                       |     |               |       |        |               |       |          |
| Initial time                       | 164 | 8.5 (1.5)     | 1.5   | 9.00   | 7.00-10.00    | 5.00  | 13.00    |
| Final time                         | 164 | 15.9 (2.2)    | 2.2   | 16.00  | 14.00-17.00   | 8.00  | 24.00    |
| Daily exposure time in hours       | 164 | 5.8 (1.3)     | 1.3   | 6.00   | 5.00-7.00     | 0     | 7.00     |
| Weekly exposure to the sun in days | 164 | 4.9 (2.2)     | 2.2   | 6.00   | 3.00-7.00     | 1.00  | 7.00     |
| Exposure in years                  | 163 | 11.1 (10.7)   | 10.7  | 8.00   | 3.00-16.00    | 0.08  | 53.00    |
| Exposure in months                 | 163 | 133.4 (127.8) | 127.8 | 96.00  | 36.00-192.00  | 1.00  | 636.00   |

**Table 3.** Frequency, Chi-squared test, p, prevalence ratio and respective confidence intervals of the presence of lip lesions associated with sociodemographic and occupational variables and general health. Natal, Northeast Brazil, 2010.

| Variable                      | Presence of lip lesions |      |                  |       |                   |             |                   |       |             |
|-------------------------------|-------------------------|------|------------------|-------|-------------------|-------------|-------------------|-------|-------------|
|                               | n                       | %    | Chi <sup>2</sup> | p     | RP <sub>adj</sub> | 95%CI       | RP <sub>adj</sub> | p     | 95%CI       |
| Sex                           |                         |      |                  |       |                   |             |                   |       |             |
| Male                          | 126                     | 47.9 | 2.263            | 0.132 | 1.248             | 0.944;1.651 | 1.231             | 0.189 | 0.903;1.680 |
| Female                        | 38                      | 38.4 |                  |       |                   |             |                   |       |             |
| Age (years)                   |                         |      |                  |       |                   |             |                   |       |             |
| 37 or more                    | 86                      | 50.6 | 2.856            | 0.091 | 1.231             | 0.981;1.546 | 1.133             | 0.304 | 0.893;1.438 |
| Up to 37                      | 76                      | 41.1 |                  |       |                   |             |                   |       |             |
| Years in the education system |                         |      |                  |       |                   |             |                   |       |             |
| Up to 6                       | 90                      | 47.4 | 0.684            | 0.408 | 1.117             | 0.885;1.409 | -                 | -     | -           |
| 6 or more                     | 70                      | 42.4 |                  |       |                   |             |                   |       |             |
| Income (R\$)                  |                         |      |                  |       |                   |             |                   |       |             |
| Up to 510.00                  | 76                      | 44.2 | 0.016            | 0.901 | 0.972             | 0.767;1.232 | -                 | -     | -           |
| 510.00 or more                | 74                      | 45.5 |                  |       |                   |             |                   |       |             |
| Type of work                  |                         |      |                  |       |                   |             |                   |       |             |
| Outdoor                       | 140                     | 44.0 | 1.328            | 0.249 | 0.807             | 0.600;1.086 | 0.754             | 0.058 | 0.562;1.010 |
| Indoor                        | 24                      | 54.6 |                  |       |                   |             |                   |       |             |
| Daily exposure (hours)        |                         |      |                  |       |                   |             |                   |       |             |
| 6 or more                     | 72                      | 46.8 | 0.108            | 0.742 | 1.052             | 0.838;1.320 | -                 | -     | -           |
| Up to 6                       | 92                      | 44.4 |                  |       |                   |             |                   |       |             |
| Weekly exposure (days)        |                         |      |                  |       |                   |             |                   |       |             |
| 5 or more                     | 86                      | 48.0 | 0.782            | 0.377 | 1.121             | 0.894;1.406 | -                 | -     | -           |
| Up to 5                       | 78                      | 42.9 |                  |       |                   |             |                   |       |             |
| Accumulated exposure (years)  |                         |      |                  |       |                   |             |                   |       |             |
| 8 or more                     | 79                      | 48.8 | 1.296            | 0.255 | 1.155             | 0.921;1.449 | -                 | -     | -           |
| Up to 8                       | 84                      | 42.2 |                  |       |                   |             |                   |       |             |
| Protection from the sun       |                         |      |                  |       |                   |             |                   |       |             |
| No                            | 31                      | 43.1 | 0.088            | 0.767 | 0.939             | 0.700;1.259 | 1.442             | 0.165 | 0.860;2.417 |
| Yes                           | 133                     | 45.9 |                  |       |                   |             |                   |       |             |
| Use of sunscreen              |                         |      |                  |       |                   |             |                   |       |             |
| No                            | 100                     | 47.4 | 0.824            | 0.364 | 1.128             | 0.891;1.428 | -                 | -     | -           |
| Yes                           | 63                      | 42.0 |                  |       |                   |             |                   |       |             |
| Use of lip balm with SPF      |                         |      |                  |       |                   |             |                   |       |             |
| No                            | 138                     | 44.7 | 0.095            | 0.758 | 0.929             | 0.682;1.265 | 0.935             | 0.674 | 0.685;1.278 |
| Yes                           | 25                      | 48.1 |                  |       |                   |             |                   |       |             |
| Use of cap/hat                |                         |      |                  |       |                   |             |                   |       |             |
| No                            | 45                      | 36.9 | 4.594            | 0.032 | 0.747             | 0.573;0.974 | 0.615             | 0.042 | 0.385;0.983 |
| Yes                           | 118                     | 49.4 |                  |       |                   |             |                   |       |             |
| Skin type                     |                         |      |                  |       |                   |             |                   |       |             |
| Light                         | 61                      | 53.0 | 3.702            | 0.054 | 1.276             | 1.016;1.602 | 1.242             | 0.066 | 0.986;1.564 |
| Dark/black                    | 101                     | 41.6 |                  |       |                   |             |                   |       |             |
| Any Habits                    |                         |      |                  |       |                   |             |                   |       |             |
| Yes                           | 94                      | 51.4 | 5.005            | 0.025 | 1.314             | 1.043;1.655 | 1.096             | 0.669 | 0.720;1.667 |
| No                            | 70                      | 39.1 |                  |       |                   |             |                   |       |             |

Continue

**Table 3.** Continuation

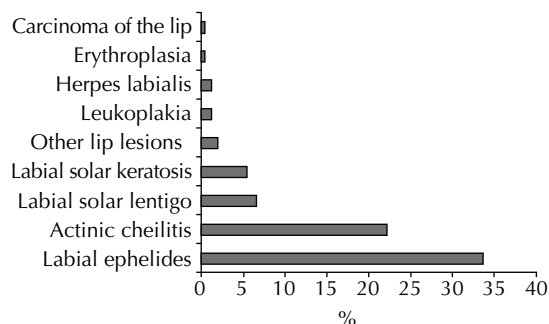
| Variable | n   | %    | Presence of lip lesions |       |                    |             |                   |       |             |  |
|----------|-----|------|-------------------------|-------|--------------------|-------------|-------------------|-------|-------------|--|
|          |     |      | Chi <sup>2</sup>        | p     | RP <sub>nađj</sub> | 95%CI       | RP <sub>adj</sub> | p     | 95%CI       |  |
| Alcohol  |     |      |                         |       |                    |             |                   |       |             |  |
| Yes      | 78  | 53.8 | 6.475                   | 0.011 | 1.357              | 1.086;1.696 | 1.238             | 0.302 | 0.825;1.858 |  |
| No       | 86  | 39.6 |                         |       |                    |             |                   |       |             |  |
| Smoking  |     |      |                         |       |                    |             |                   |       |             |  |
| Yes      | 45  | 50.0 | 0.829                   | 0.363 | 1.143              | 0.893;1.463 | -                 | -     | -           |  |
| No       | 119 | 43.8 |                         |       |                    |             |                   |       |             |  |

412 lesions were diagnosed. The majority of the individuals were dark or black-skinned and approximately a quarter were affected by lip lesions (upper and lower lip). Actinic cheilitis (AC) and Ephelides were the most prevalent type of lip lesion; erythroplasia and lip carcinoma were the least common (Figure).

The majority of the workers who smoked or consumed alcohol and had white skin were diagnosed with some kind of lip lesion. Those who consumed alcoholic beverages once or more in the preceding 30 days had 35% more lesions when compared to those who never drank alcohol. The use of a hat/cap as means of protection from the sun was linked to the presence of lip lesions in the workers irrespective of sex, age, type of work, use of sunscreen, use of lip balm with SPF, skin type and tobacco and alcohol consumption. Workers who reported using them had 39% more lesions compared to those who never used a hat/cap (Table 3).

## DISCUSSION

Approximately a quarter of the workers were affected by lip lesions, which concurs with their work history according to exposure to the sun and possibly inadequate means of solar protection. Camposi and Margiotta (2001)<sup>5</sup> diagnosed potentially malignant lesions in 118 inhabitants of a Mediterranean island and observed AC in 4.2% of individuals. Greater prevalence was observed in a study by Silva et al (2006),<sup>17</sup> which



**Figure.** Relative frequency of lip lesions diagnosed in beach workers. Natal, Northeast Brazil, 2010.

examined 111 fishermen from fishing communities in Florianópolis, SC, and diagnosed 43.2% with cases of AC. The inclusion criteria for the sample, as well as occupations related to local conditions, may explain different incidences. Zanetti et al<sup>22</sup> (2009) reported prevalence of AC approximate to that of this study (15.7%) diagnosing AC in 18.1% of the 420 individuals examined during a Public Health Campaign in the city of Campinas, SP, in 2005.

The majority of the workers who made use of some kind of protection from UV radiation showed similar incidence of lesions to those individuals who did not take any measures to protect themselves, with the exception of workers who used hats/caps. The way in which these measures were adopted is important in understanding the appearance of lesions.

El Sayed et al observed that the prevalence of sunburn was greater among young people using sunscreen, a fact that has also been found in other studies. The majority of individuals diagnosed with lesions were using sunscreen at the time the research was carried out, suggesting inadequate use as suggested by El Sayed et al: "either the individuals feel they are protected and so stay in the sun longer, or they do not use the product with the recommended frequency".<sup>5,9</sup>

The "sunscreen paradox" is an effect which has been observed in individuals exposed to the sun. McCarthy et al<sup>15</sup> showed that bathers using higher SPF factor sunscreens were more frequently burned when compared with those who used a lower factor or no sunscreen. In a study on the use of sunscreen in children and its correlation with the development of nevi, Autler et al<sup>2</sup> concluded that increased number of nevi was related to increased sun exposure and to the use of sunscreen. For higher levels of exposure, the count of nevi in children who always used sunscreen was twice as high compared to that in children who never wore it.

Inadequate protection occurs if the factor is low compared to the length and intensity of sun exposure, if the quantity is insufficient and if it is not applied before sun exposure. Use of sunscreen differs widely from recommendations, as has been demonstrated in various

studies.<sup>8,3,4,18</sup> The ideal sunscreen to avoid burning, ageing and skin cancer should meet certain criteria relating to the technology with which it is produced, product performance evaluations, norms and standards of use and, above all, the individual concerned applying it correctly, evenly and repeatedly.<sup>16</sup>

The same rationale is applicable to the subjects of this study as regards using a hat/cap. In addition to these accessories not being made of fabric proven to be photo resistant, the lip area is often not totally covered by the shadow of the hat/cap and remain exposed to the dangerous effects of UV radiation.

To conclude, a high prevalence of lip lesions was found. Workers who reported using a hat/cap were those most affected by lesions either as they thought they were protected or for spending more time in the sun.

This study made use of some self-reported information, which may have generated some doubt about the results. The importance and the validity of this information

cannot be disregarded, even though its limitations are known. The time variables relating to occupation, as well as those which deal with photoprotection measures and habits, are part of this context.

Individual analysis of the lesions studied may more clearly demonstrate correlations with the variables involved in this study. The development and progression of these lesions is still unclear. Intermittent or continuous solar exposure may have different effects on the origin of these pathologies.

The objective of this study was to contribute to a deeper understanding, for health professionals, the scientific community and the health authorities, of the epidemiological aspects of lip lesions due to exposure to the sun. The harmful effects of UV radiation on health, particularly for those who are intensely and continually exposed, have been demonstrated. It is essential to intensify educational and preventive measures and ensure appropriate preventive measures for this population.

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The authors declare that there were no conflicts of interest.