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Sunlight Exposure on the Facial Region of Professional Fishermen: Risk Factors Unveiled

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Authors' contributions

This work was carried out in collaboration among all authors. Authors MFSD, TNCB, NBCS, MLLG, and EMS contributed to the material preparation, data collection and analysis. Authors MFSD and MLLG wrote the manuscript. Authors APTS, JMASG, GDM, ALCM, and SKB reviewed the draft, provided comments on previous versions and revised the manuscript. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Aims: The coastal regions, due to the professional opportunities related to the sea and the beach, have in their population many individuals who are exposed to the sun daily. Among these professions we can mention fishermen, sailors, dockers and beach vendors. This project aims to evaluate photoexposure, habits and risk factors for the development of lesions in the head and neck region and knowledge of professional fishermen.
Study Design: Observational study.
Place and Duration of Study: Port region of *Baixada Santista*, SP, Brazil, between November 2022 and March 2023.
Methodology: Individuals who work professionally in industrial boat fishing (n=24) and individuals who neither work nor expose themselves to the sun were selected for control (n=24). Participants answered questions, in order to obtain information about their habits and work activity. They were asked about working hours, time working in the activity, time of exposure to the sun and sun protection. Subsequently, the participants underwent an intra- and extra-oral clinical examination.
Results: The questionnaire results show that most fishermen do not use sunscreen or lip balm, despite the reported high sun exposure. Lip dryness was the most observed aspect in the Fishermen Group, being present in the vast majority of participants (90.47%), compared to 23% in the Control Group.
Conclusion: The clinical relevance of our study lies in the findings that show the necessity to prevent lip dryness and its possible consequences in professional fishermen. There is a need for information regarding lip protection and hydration for this population.

Keywords: Fishermen; portworkers; ultraviolet rays; early cancer detection; precancerous lesions.

1. INTRODUCTION

The coastal regions, due to the professional opportunities related to the sea and the beach, have in their population many individuals who are exposed to the sun daily. Among these professions we can mention fishermen, sailors, dockers, beach vendors, among others (Maia, 2016). Fishing is an arduous practice, where you work without a fixed schedule and under varied climatic conditions, which can lead to irregularities in your diet, tension, use of tobacco, alcohol and the installation of harmful habits. Commercial fishing is physically demanding and strenuous work, which takes long cycles of repetitive activities associated with health conditions, to identify common exposures and health outcomes among fishermen (Doza, 2022).

The physical state of large-scale workers is also influenced by conditions in their workplace (Anzil, 2016, Yukun, 2016). Oral mucosal lesions can occur as a result of infections, local shock or irritation, systemic diseases and uncontrolled use of tobacco and alcohol (Hault, 2016). Mouth cancer is more prevalent in men, especially those over 40 years old. The difference between genders can be attributed to the consumption of alcohol and tobacco, since, despite changes in habits in recent years, such consumption is more frequent among males in most Brazilian states. In addition, this condition may be related to sun exposure linked to the profession, in which there is still a prevalence of men in certain functions (Hault, 2016, Fitzmaurice, 2019, Korpinen, 2018). Actinic cheilitis, a potentially malignant lesion, is also commonly found in individuals whose occupational activities are related to chronic sun exposure, including fishermen (Piñera-Marques, 2010, Surdu, 2013).

Despite the widespread dissemination of information about the cumulative harm caused by unprotected sun exposure, a large part of this population is unaware that the lip must also be protected (Wittlich, 2020, Glanz, 2007). The diagnosis of potentially malignant wounds is of fundamental importance so that the follow-up and, if necessary, the treatment, are carried out as soon as possible.

Considering the possible association of risk factors, such as exposure to sunlight and possible acquired harmful habits, this paper aims

to observe sunlight exposure and risk factors for the development of lesions and to evaluate the habits and knowledge of professional fishermen in the port region of Santos about sun protection. It also aims to verify, through clinical examination, possible injuries related to exposure to the sun, in the head and neck region.

2. METHODOLOGY

Individuals who work professionally in fishing on board or not, according to the groups to be evaluated, were recruited. The project was composed of two groups:

- Fishermen Group (n=24): fishermen who work professionally in boat fishing, exposed to the sun and sea salt;
- Control Group (n=24): group of individuals matched in gender and age with fishermen, but with little sun exposure (for example, office workers).

2.1 Inclusion Criteria

- Be between 18 and 70 years old;
- Good general health;
- Fit the sun exposure standards described in each group.

2.2 Exclusion Criteria

- Individuals with a previous history of skin cancer.

The sample was collected by convenience, depending on the number of fishermen available for participation. Recruited fishermen work in octopus boats on the coast of *Baixada Santista*, SP, Brazil (Fig. 1).

The project was approved by the Research Ethics Committee of UNIMES, with approval number 62582722.0.0000.5509. After signing the Free and Informed Consent, participants answered a questionnaire in order to obtain information about their habits, work activity, such as working hours, time working in the activity, time of exposure to the sun and sun protection.

Subsequently, clinical examinations were performed in well-lit environments. Intra- and extra-oral physical examination was performed in order to analyze possible alterations caused by sun exposure and exposure to salt. The entire oral mucosa was examined, as well as the semimucosa of the lips and the cervical lymph node region. All individuals underwent the same procedures, questionnaire and clinical examination. The data obtained were analyzed descriptively and statistically.

Fig. 1. Fishing boat of octopus fishermen from the Port of Santos, SP, Brazil, exemplifying the intense exposure to sunlight during fishing work

3. RESULTS AND DISCUSSION

In Table 1, the descriptive data of the groups are presented.

Relating possible habits with risk factors for the development of injuries, the participants were asked about tobacco use and alcohol consumption. They answered the question "How often do you use the following types of tobacco?" These results are described in Table 2 (Fishermen Group) and 3 (Control Group).

The answers referring to the question "During the last 30 days, on the days when you consumed alcohol, how many drinks did you usually drink per day?" are shown in Figs. 2 and 3.

Table 1. Description of gender, age and residence of the research groups

	Fishermen Group (n=24)	Control Group (n=24)
Gender	100% male (n=24)	100% male (n=24)
Mean age (years)	48,125	49
Residence	n=23 urban (95,8%) n=1 semiurban (4,2%)	n=24 urban (100%)

Table 2. Frequency of tobacco use in the Fishermen Group

	Everyday	Several times a week	Once a week	Several times a month	Rarely	Never
Cigarette	4 (16,7%)	0 (0%)	2 (8,3%)	0 (0%)	0 (0%)	18 (75%)
Cigar	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (4,2%)	23 (95,8%)
Smoking pipe	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	24 (100%)
Chewing tobacco	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	24 (100%)
Snuff	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	24 (100%)

Table 3. Frequency of tobacco use in the Control Group

	Everyday	Several times a week	Once a week	Several times a month	Rarely	Never
Cigarette	1 (4,2%)	0 (0%)	0 (0%)	0 (0%)	1 (4,2%)	22 (91,7%)
Cigar	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (4,2%)	23 (95,8%)
Smoking pipe	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	24 (100%)
Chewing tobacco	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	24 (100%)
Snuff	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (4,2%)	23 (95,8%)

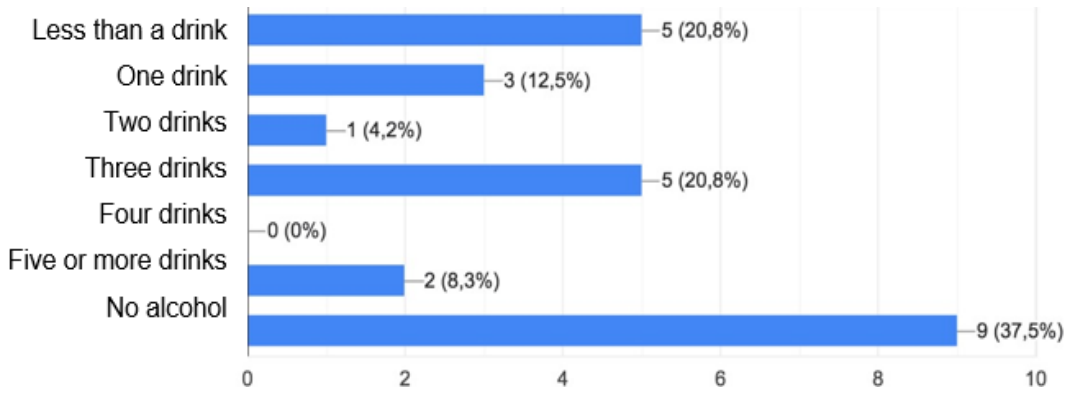

Fig. 2. Alcohol consumption in the Fishermen Group

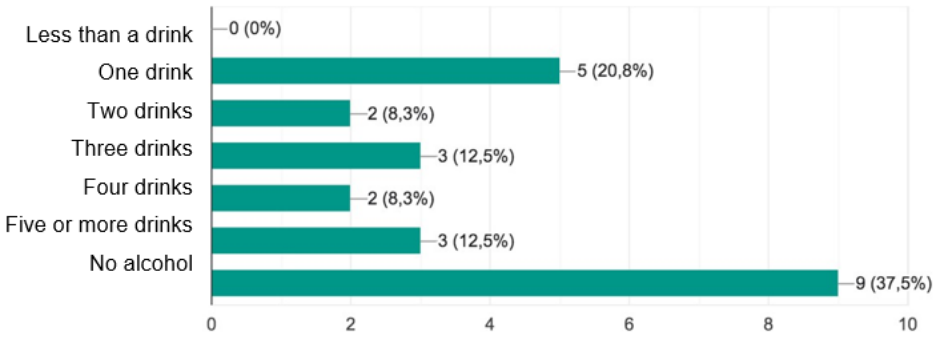

Fig. 3. Alcohol consumption in the Control Group

Fishermen were asked how long they stayed on the fishing boat. Two participants (8.3%) answered “a few hours a day”, 2 (8.3%) answered “a few full days a week”, 17 (70.8%) answered “a few full weeks a month” and 2 (8.3%) answered “full months during the year”.

In the Fishermen Group, five participants (20.8%) reported knowing lip sunscreens and 21 (87.5%) reported knowing sunscreens. In the Control Group, 11 participants (45.8%) reported knowing lip sunscreens and 24 (100%) reported knowing sunscreens. Individuals were asked if they use any of these forms of protection. The results are shown in Figs. 4 and 5. Then, they answered the question “If you use the protector, do you repeat the application during the day?”. The answers are recorded in Figs. 6 and 7. In the Pescadores Group, the 5 participants who claimed to reapply sunscreen replied that they do: “3 times a day”, “all day long” (2 participants), “every 2 hours” and “on the lip from time to time”. In the Control Group, participants reported reapplying between 2, 3 or 4 times a day, or when they feel lip dryness. Participants were also asked about lip balm use specifically. The answers are shown in Figs. 8 and 9.

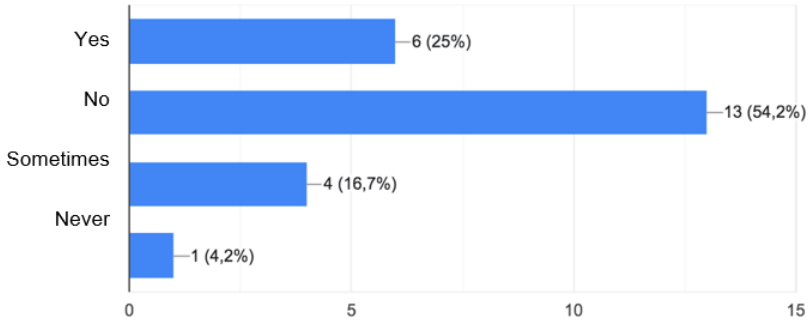

Fig. 4. Reported use of sunscreens by the Fishermen Group

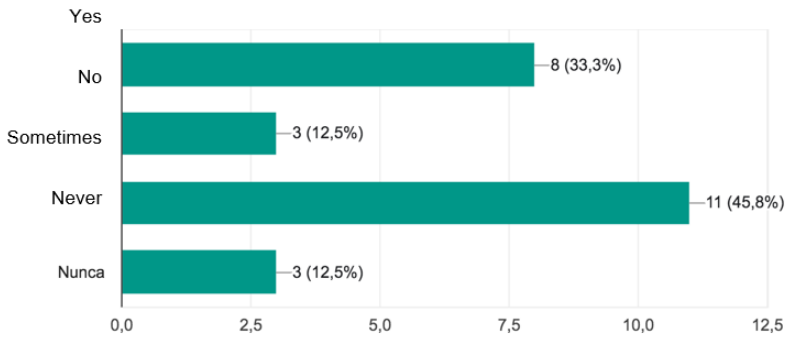

Fig. 5. Reported use of sunscreens by the Control Group

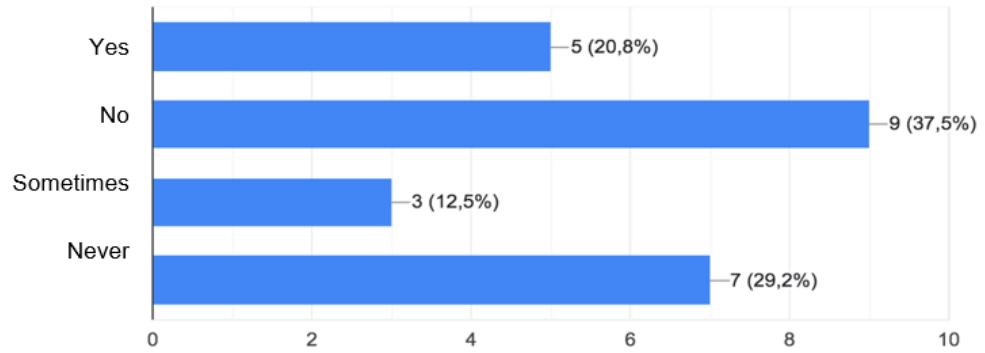

Fig. 6. Reports of reapplication of sunscreen during the day in the Fishermen Group

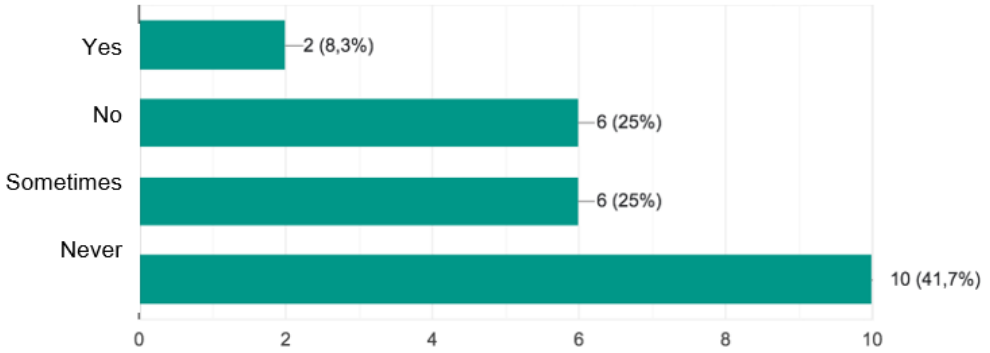

Fig. 7. Reports of reapplication of sunscreen during the day in the Control Group

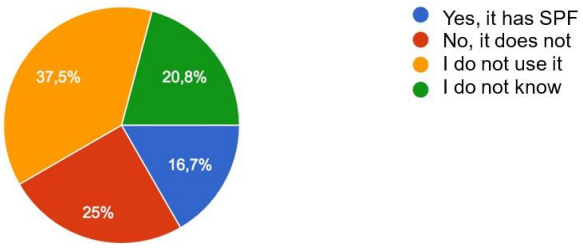

Fig. 8. Answers about the use of lip protection, and whether it has SPF or not, in the Fishermen Group

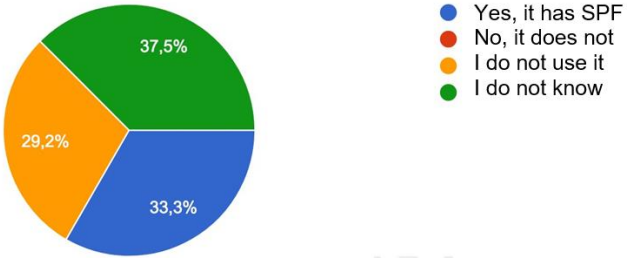

Fig. 9. Answers about the use of lip protection, and whether it has SPF or not, in the Control Group

When asked about the use of any accessory for sun protection, in the Fishermen Group, 18 participants (75%) reported using caps and 6 (25%) did not use any. In the Control Group, 5 participants (20.8%) reported wearing caps, 8 (33.3%) did not use any, 7 (29.2%) answered sometimes and 4 (16.7%) never. When asked how long they are exposed to the sun, in an average of hours per day, while working, the fishermen answered in an average of 5.5 hours per day. In the Control Group, the average was 0.625 hours.

Out of the 48 participants who answered the questionnaires, 42 (n=21 per group) underwent face-to-face clinical evaluations. In clinical examinations, participants were examined for factors that could be associated with changes caused by fishing activity. The factors examined and the percentage present in each group are shown in Fig. 10.

Some soft tissue and dental tissue alterations were also observed with due particularity. These alterations and the participants who presented them are presented in Table 4. Hyperkeratoses on the lip are important aspects, since they are related to the degree of dryness already observed and to exposure to sunlight, wind and sea salt, in the Fishemen Group. Bruxism is also a relevant factor to be observed, as it may be related to the stress caused by fishing activity.

Lip dryness was the most observed aspect in the Fishermen Group, being present in the vast majority of participants (90.47%). Consequently, this variable was used in some relative risk calculations. First, the calculation was performed to verify whether the risk was really higher in the Fishermen Group, in relation to the Control Group (Table 5). A risk greater than 1 (3.91) shows the great risk of lip dryness in the Fishermen Group, being almost 4 times greater than in the Control Group.

Then, the relative risk calculation was made relating the use of lip balm with sun protection factor (SPF), reported by the participants, and lip dryness. In this case, the relative risk found was equal to 0.77, showing a lower risk of lip dryness in participants who used lip balm with SPF, as shown in Table 6.

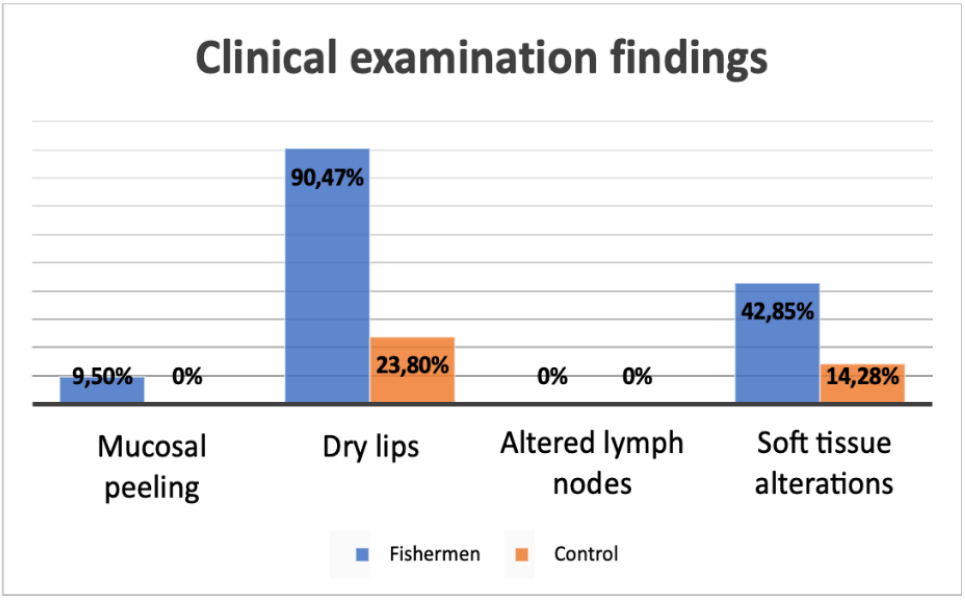

Fig. 10. Factors observed in the clinical examination in the research groups

Table 4. Soft tissue changes and other changes found on clinical examination

Soft tissue changes/others	Fishermen Group	Control Group
Hyperkeratosis on the lip or mucosa	3 (14,28%)	1 (4,76%)
Dark lesions on the buccal mucosa	2 (9,5%)	0
Signs of bruxism/tooth wear	6 (28,57%)	1 (4,76%)
Presence of ulcer compatible with thrush	0	1 (4,76%)

Table 5. Relative risk of dry lip between groups

	Dry lips		Total	Risk	Relative risk
	Yes	No			3,91
Fishermen Group	19	2	21	90%	
Control Group	5	16	21	23%	

Our results show that most fishermen do not use sunscreen or lip balm, despite the reported high sun exposure. In addition, clinical examinations demonstrated a higher risk of lip dryness in fishermen, and a higher percentage of soft tissue alterations, such as dark spots and hyperkeratosis. Furthermore, a greater number of participants in this group also showed clinical signs of bruxism. Lip dryness and hyperkeratosis observed on the lips of fishermen may be related to exposure to sunlight, wind and sea salt. Bruxism may be related to stress during the work activity of fishing.

In 2010, Piñera-Marques et al*.* evaluated the presence of actinic lesions on the lower lip of fishermen. Clinical, cytopathological (through exfoliative cytology), and histopathological (through biopsies) exams were performed in patients who presented signs suggestive of dysplasia. Smears were taken from the lower lip vermillion of 125 fishermen living in Florianópolis, and 30 control individuals underwent cytological analysis. It was concluded that the fishermen studied had a high prevalence of actinically induced injuries. These conditions were strongly associated with infiltration and swelling of the vermilion margin of the lower lip. The lip dryness found in our study corroborates, then, with this previous study, since in both studies lip alterations were found.

A 2014 study (Chandroth, 2014) evaluated the presence of wounds in the oral mucosa of fishermen in a city in India. A descriptive cross-sectional survey was carried out to assess the prevalence of oral mucosal lesions among 979 fishermen. Most of the study population consumed tobacco and alcohol (88.1%) in some form and used toothpicks (42.9%) to clean their teeth. Altogether, 30.03% of the study subjects suffered from oral mucosal alterations. Leukoplakia (13.8%) was the most prevalent lesion. The most affected sites were the lips and the vermillion border of the lip. The prevalence of oral mucosal changes was significantly associated with age, sex, oral hygiene practices and adverse habits. In our study, a greater number of soft tissue alterations were also found in the Fishermen Group, when compared to the Control Group.

In 2016, a study evaluated the prevalence of deleterious oral habits and oral mucosal conditions in the fishermen population of Mahe, southern India (Anzil, 2016). 362 fishermen aged between 15 and 54 years were evaluated. The overall prevalence of smoking, alcohol consumption and chewing tobacco was 24.3, 48.85 and 32.4%, respectively. Smokeless tobacco (32.4%) was the most prevalent habit, followed by smoking (24.3%). The prevalence of oral mucosa lesions was 14.9%. There was a statistically significant association between age groups and the considered habits. In the present study, the Fishermen Group also had more smokers than the Control Group. Also, some fishermen reported smoking more while inside the boat.

A 2019 study evaluated the occupational exposure to solar ultraviolet radiation of a group of fishermen in Northern Italy (Modenese, 2019). High levels of individual UV exposure were found in a group of fishermen from northern Italy, even when the measurement campaign was conducted during partly cloudy spring days, with 43% of daily personal UV measurements potentially exceeding occupational limits, in case of exposure of uncovered areas of the skin. They emphasize that the risk of UV light must be considered in all outdoor occupations, and that it is important to raise awareness of this almost neglected occupational threat, which is an extremely frequent cause of adverse health effects and occupational diseases. In the present study, there was also a need for information about the importance of sun protection for this population.

Table 6. Relative risk of dry lips with or without the use of lip balm with SPF

	Dry lip		Total	Risk	Relative risk
	Yes	**No**			0,77
With the use of lip balm with SPF	5	5	10	50%	
Without the use of lip balm with SPF	15	8	23	65%	

Other studies evaluated the general oral conditions of fishermen. A 2014 study in India evaluated the oral conditions of 1100 fishermen and 1100 non-fishermen. The results of this study suggest that the oral health of the fisherman population was relatively poor, with a high prevalence of caries and poor periodontal health, when compared to the non-fisherman population (Asawa, 2014). In 2017, an assessment of the periodontal health of Indian fishermen was conducted. More than 800 anglers were surveyed, with the Community Periodontal Index and Attachment Loss measurement showing that 100% of study subjects suffered from one form or another of periodontal disease. Furthermore, 90.26% of the study participants consumed smoke or smokeless tobacco. Alcoholism was also observed in 78.81% of the study subjects. The study explored the possibility of correlating these habits with the results of the periodontal disease index (Dany, 2017).

A 2018 study conducted in Malaysia selected 242 multiracial fishermen, aged between 18 and 75, from five fishing villages (Singh, 2018). Interviews were conducted with participants using a pre-validated WHO oral health questionnaire. The prevalence of oral health problems in this study was 47.5%. "income", "type of fishing", "additional occupation", "age" (years), "frequency of pies, rolls consumed" and "frequency of sweets and soft drinks consumed" were significant predictors of the fishermen's oral health status.

In 2021, a systematic review aimed to fill a relevant gap in the scientific literature, evaluating the effectiveness of preventive interventions (primary, secondary and tertiary) available in outdoor workplaces, to reduce the risk related to sun exposure and ultraviolet rays from exposed workers, including fishermen, following the definitions of the International Agency for Research on Cancer, with the final objective of preventing, identifying and treating skin cancer induced by these rays, because none of the existing reviews focused on intervention studies (Modenese, 2021).

Research on diseases in colonies and populations of fishermen, focusing on the epidemiological profile, skin and mouth cancer and the presence of lip alterations have also been investigated in national Brazilian studies (Almeida 2020, Rios, 2011, Bushatsky, 2016, Medeiros, 2017, Joabson, 2020, Ribeiro, 2017, Silva, 2006).

The findings reported in the cited studies, as well as our results, show the need for information and prevention regarding oral health and photoexposure in fishermen. They are at greater risk of developing complications when compared to control groups, showing the necessity of consciousness, both for them and for health professionals who tend to this population.

4. CONCLUSION

Fishermen seem to be at greater risk of developing lip lesions and lip dryness due to sun exposure, often unprotected, and deleterious habits practiced by this population. Awareness programs regarding the use of lip sunscreen should be carried out to prevent potentially malignant changes in these port workers.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

CONSENT

All authors declare that written informed consent was obtained from the participants.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. The project was approved by the Research Ethics Committee of UNIMES, with approval number 62582722.0. 0000.5509.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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