

SUN EXPOSURE AND PHOTOPROTECTION HABITS AMONG RURAL WORKERS IN THE MUNICIPALITY OF GUARACIABA

HÁBITOS DE FOTOEXPOSIÇÃO E FOTOPROTEÇÃO ENTRE TRABALHADORES RURAIS DO MUNICÍPIO DE GUARACIABA

Giulia Bárbara Conte¹ e Ana Paula Christ²

ABSTRACT

Brazilians are frequently exposed to the effects of intense and prolonged sun exposure through recreational and occupational activities. Rural workers, who are exposed to the sun on a daily basis, are particularly at risk of developing skin cancer. Hence, this study aims to evaluate the sun exposure habits and photoprotection measures adopted by rural workers living in a small municipality in western Santa Catarina. This exploratory research administered questionnaires to rural workers between November 2022 and March 2023. Most participants (75%) were over 50 years old, with 79% having a low level of education and only having completed elementary school. Moreover, 96% have worked in the field for more than 10 years, and almost half of those interviewed (47%) are exposed to the sun for 4-8 hours a day. Additionally, several gaps were identified in terms of adopting photoprotection measures. The majority of interviewees (85%) reported using wide-brimmed hats as a protective measure, followed by wearing long clothing (60%) and using sunscreen (52%). It is worth noting that 49% of respondents do not reapply sunscreen, compromising its effectiveness. Based on the findings, this study highlights the potential risk of occupational skin cancer among this population and emphasizes the need to raise awareness about the risks of excessive sun exposure and the importance of individual protection measures.

Keywords: occupational exposure; skin neoplasms; sunscreen.

RESUMO

Os brasileiros são constantemente submetidos aos efeitos decorrentes da exposição solar intensa e prolongada, seja pela realização de atividades recreativas ou ocupacionais. Os trabalhadores rurais estão diariamente expostos ao sol, estando assim muito propensos a desenvolver câncer de pele. O objetivo do estudo foi avaliar os hábitos de fotoexposição e as medidas de fotoproteção adotadas por trabalhadores rurais residentes em um município de pequeno porte do oeste de Santa Catarina. Pesquisa do tipo exploratória, através de questionários aplicados com trabalhadores do meio rural, no período de novembro de 2022 a março de 2023. A maioria dos participantes (75%), possui idade acima de 50 anos, sendo que 79% possui baixo nível de escolaridade, tendo estudado somente até o ensino fundamental. Observou-se também que 96% deles trabalha no campo há mais de 10 anos, e quase metade dos entrevistados (47%) se expõe ao sol durante 4 a 8 horas diárias. Ademais, observou-se inúmeras lacunas com relação a adoção de medidas de fotoproteção, sendo que o chapéu de aba larga foi a medida de proteção adotada pela maioria dos entrevistados (85%), seguido das roupas compridas (60%) e uso do protetor solar tópico (52%), destacando que 49% não reaplica o produto, acabando por comprometer a sua eficácia. Com base no exposto, evidencia-se o potencial risco desta

1 Discente do curso de graduação em Farmácia da Universidade do Oeste de Santa Catarina (UNOESC), São Miguel do Oeste, SC, Brasil. E-mail: giubconte@gmail.com. Orcid: 0009-0001-2576-7895

2 Doutora em Ciências Farmacêuticas. Docente do curso de Farmácia da Universidade do Oeste de Santa Catarina (UNOESC), São Miguel do Oeste, SC, Brasil. E-mail: analara.cp@gmail.com. Orcid: 0000-0001-9368-1738

população ao desenvolvimento do câncer de pele ocupacional e se reforça a necessidade de conscientizar os mesmos sobre os riscos da exposição solar excessiva e da negligência das medidas de proteção individual.

Palavras-chave: *exposição ocupacional; neoplasias de pele; protetores solares.*

INTRODUCTION

Due to its geographical location, Brazil is known for having high insolation, making it one of the countries with the highest levels of ultraviolet (UV) radiation in the world (SBD, 2017). This means that the resident population is exposed to UV radiation and its effects on a daily basis. UV radiation is categorized into three types: UVA, UVB, and UVC, with UVC rays being absorbed by the ozone layer, leaving UVA (95%) and UVB (5%) rays to reach the Earth (WILD; WEIDERPASS; STEWART, 2020).

Acute exposure to the sun can cause burns, changes in skin pigmentation, and promote the synthesis of vitamin D. Chronic exposure to the sun can lead to more severe cellular and molecular damage, such as reactive oxygen species production and genetic material damage (YOUNG; CLAVEAU; ROSSI, 2017). Consequently, individuals who are exposed to the sun's rays on a daily basis throughout their lives are more susceptible to developing various diseases, including skin neoplasms (SBD, 2017).

While solar radiation is the primary causal factor for skin cancer, it can be influenced by other factors such as frequent pesticide and ionizing radiation exposure and ingesting toxins from water and food. Additionally, individual factors, including lifestyle choices, skin phototype, and genetic predisposition, can also contribute to skin cancer development (GRACIA-CAZAÑA *et al.*, 2020).

Skin cancer is classified into different types based on its origin and severity. The main types include non-melanoma skin cancer, which can be further categorized into basal cell and squamous cell carcinomas, and melanoma skin cancer, which starts in melanocytes (BRASIL, 2023). The incidence of both melanoma and non-melanoma skin cancer is increasing worldwide, particularly among the elderly population, which may be attributed to factors like increased life expectancy (WILD; WEIDERPASS; STEWART, 2020).

It is estimated that many of the more than 5 million cases of skin cancer diagnosed each year could be prevented by implementing the appropriate protective measures recommended by health organizations worldwide (ACS, 2019). In Brazil, where the disease is highly prevalent, the southern region experiences a higher incidence of skin cancer, particularly melanoma, in both men and women. In the rest of the country, non-melanoma skin cancer is the most common type (BRASIL, 2022).

It is estimated that the country will register 220,490 cases of non-melanoma skin cancer per year during the three-year period between 2023 and 2025. Of these cases, 101,920 will affect men and 118,570 will affect women. These figures represent an increase of approximately 397,420 cases

compared to the previous three-year period between 2020 and 2022 (BRASIL, 2019, 2022). For melanoma, 8,980 new cases are expected, an average of 500 more cases than the previous three-year period, indicating that melanoma is less prevalent (BRASIL, 2022).

Sun exposure can occur through recreational or occupational activities. An example of the latter is rural workers, who often work long hours and are exposed to the sun at inappropriate times, making them highly susceptible to skin cancer. Additionally, the low level of education among this population contributes to their lack of knowledge about photoprotection measures, which is a significant problem, as adopting these measures is an important way to prevent the disease (CARVALHO *et al.*, 2021).

The most effective way to reduce the incidence of skin cancer is to avoid unnecessary sun exposure, particularly between 9:00 am and 3:00 pm when the sunlight is strongest and causes more harm to health (WILD; WEIDERPASS; STEWART, 2020). Moreover, the Brazilian Society of Dermatology (SBD) recommends combining various sun protection measures during sun exposure as there is no single solution but rather a combination of measures (SBD, 2017).

These measures include wearing appropriate clothing covering the entire skin, such as long-sleeved dark pants and snug-fitting t-shirts. When it comes to sunscreen, choosing products that provide protection against both UVA and UVB rays, with a sun protection factor (SPF) of 30 or higher, is important. Additionally, the sunscreen should be applied generously to cover all exposed areas and reapplied every 2 hours. Wearing a wide-brimmed hat and sunglasses is also essential for complete protection (ACS, 2022).

Given the increasing number of cases of skin cancer, particularly among workers at occupational risk, this study aims to identify the main factors related to sun exposure among rural workers in the municipality of Guaraciaba in Santa Catarina (southern Brazil). It also intends to assess the photoprotection measures that they currently use and raise awareness about the importance of these measures.

METHODS

An exploratory, cross-sectional study was conducted to gather data directly from rural workers residing with similar sun exposure levels. These workers were conveniently recruited from their homes, with individuals under the age of 18 excluded.

The study was approved by the Research Ethics Committee of the Universidade do Oeste de Santa Catarina (UNOESC) under protocol no. 5.731.948/2022. The questionnaires were administered from November 2022 to March 2023. All participants were informed about the purpose of the research and its ethical and confidential nature and signed the informed consent form.

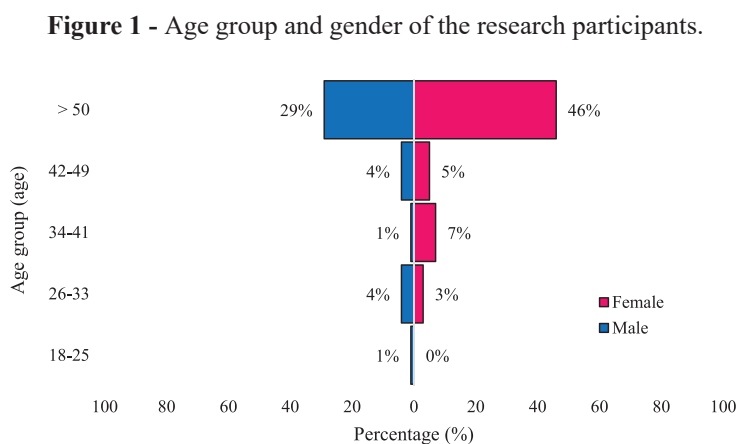
Data was collected through two questionnaires. The first questionnaire included sociocultural questions, such as gender, age, marital status, level of education, and years of work in the field,

and the second one focused on the workers' knowledge of skin cancer, their habits related to sun exposure, and the protective measures they took. At the end of the interview, a brochure containing the main photoprotection measures was distributed to raise awareness among participants, providing an opportunity for suggestions and clearing doubts.

The data was analyzed using simple descriptive statistics and processed using the Excel 2019 software, which generated a database. Measures such as mean, standard deviation, and percentage were used for interpretation. The findings were then compiled into tables and graphs for better presentation.

RESULTS

In total, 168 rural workers were recruited. The municipality of Guaraciaba has an estimated population of 10,488 people, with 4,982 residing in rural areas. Therefore, it was determined that 3.4% of the rural residents in the municipality were interviewed. Additionally, only individuals above the age of 18 participated in the study, with the majority being women (62%) and men accounting for only 38% of the participants. The participation of volunteers based on age group and gender is depicted in Figure 1.



Source: Prepared by the authors (2023).

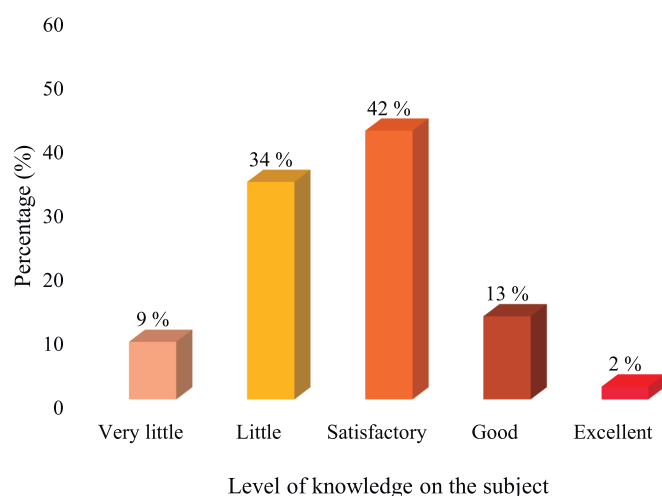
The survey results indicate that 96% of the participants have worked in rural areas for over 10 years, while the remaining 4% have worked for less than 10 years. This suggests that the majority of participants started working in agriculture at a young age, possibly even during their childhood, and have continued to do so until now. It is worth noting that the survey respondents live and work on family farms in rural areas, which may contribute to their extended tenure in the countryside.

In terms of education, out of the 168 volunteers, 79% had only completed elementary school, with 85% of them being over 50 years old. Additionally, 17% of the interviewees had

pursued education up to secondary school, primarily consisting of individuals over 50 years old (39%). Only 3% of the interviewees had a higher education, with the majority (60%) falling between the ages of 26 and 33. This suggests an increase in educational attainment among the younger population.

Regarding knowledge about skin cancer, most participants (42%) considered their knowledge of the subject to be satisfactory, as depicted in Figure 2. Following this, some believed they had limited knowledge (34%), while only 2% regarded their understanding of the subject as excellent.

Figure 2 - Participants' reported knowledge of skin cancer.



Source: Prepared by the authors (2023).

When asked about their interest in learning more about “skin cancer,” most individuals (79%) expressed a desire to expand their knowledge on the subject, while a minority (17%) stated that they were not interested. Among those who expressed disinterest, 43% believed they already had satisfactory knowledge, while 26% admitted to having limited knowledge but still showed no interest in learning more.

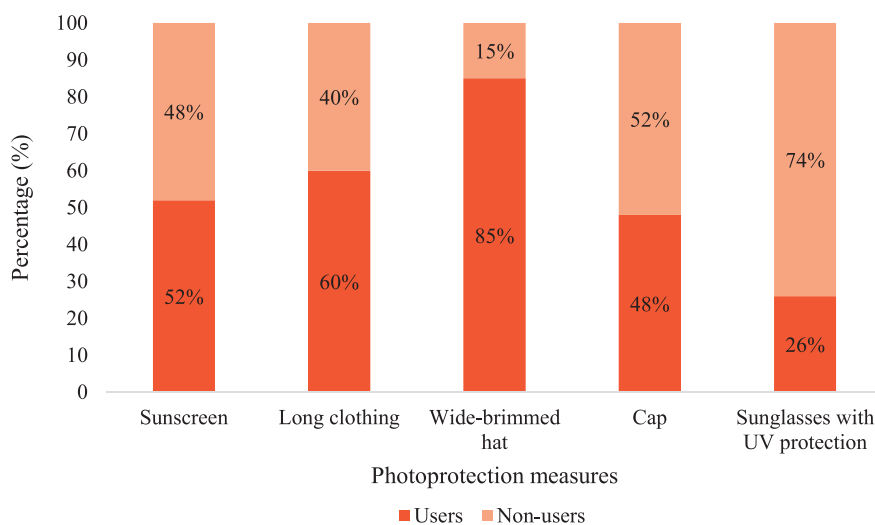
Participants were also questioned about any personal history of skin cancer or its presence in their families. Of all the interviewees, 23 individuals (14%) reported having been diagnosed with the disease, with 22 of them being over 50 years old (Table 1). As for family medical history, cases of the disease were reported in all age groups, with 67 individuals (40% of all interviewees) having a relative with skin cancer. For the purposes of this study, relatives up to the second degree were considered.

Table 1 - Cases of skin cancer among participants and their families.

Age group (years)	Has skin cancer	Family history of skin cancer
18-25	0 participants	1 participant
26-33	1 participant	3 participants
34-41	0 participants	5 participants
42-49	0 participants	9 participants
>50	22 participants	49 participants
Total	23 participants	67 participants

In terms of photoprotection measures adopted by rural workers, most individuals mentioned using sunscreen (52%), wearing long clothes (60%), and wearing a wide-brimmed hat (85%), with the latter being the most widely adopted measure among the study population (Figure 3). Although the results indicate that three out of the five photoprotection measures mentioned were used by more than half of the individuals, some still neglect personal protection measures, with 1% of workers stating that they did not use any of the mentioned items.

Figure 3 - Use of photoprotection measures among participants in all age groups.

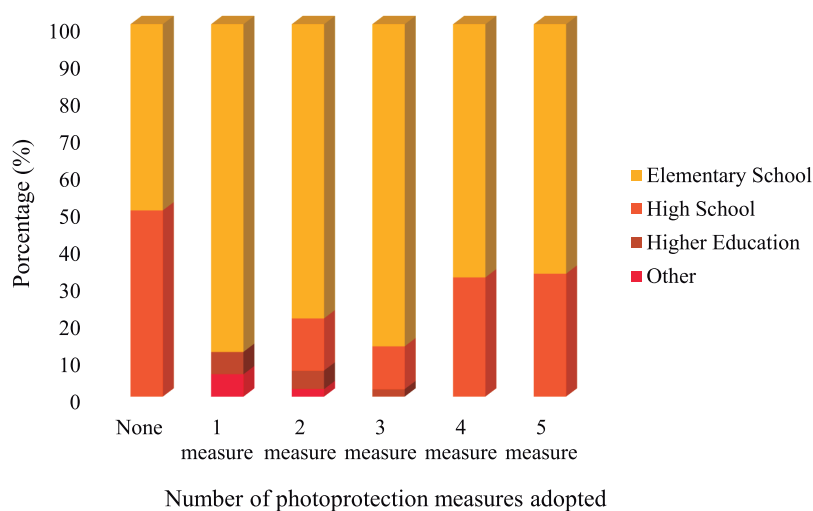


Source: Prepared by the authors (2023).

Regarding the use of long clothes, workers cited discomfort in carrying out certain farm activities while wearing clothes that were too long and/or tight-fitting. As for hats and caps, there were differing opinions, with some individuals preferring one over the other. The reasons for not wearing sunglasses were not provided. Lastly, other measures mentioned by individuals included wearing clothing made from fabric with UV protection, applying UV protection film on agricultural machinery, and using an umbrella when working in the sun.

We attempted to correlate the adoption of photoprotection measures with education level, although no relationship was found between higher education and greater adherence to such measures (Figure 4). When examining the non-adoption of photoprotection measures, 50% of this population had completed high school, while the other 50% had only completed elementary school. Among those who did adopt the five photoprotection measures, adherence was higher (67%) among individuals who had only completed elementary school, compared to 33% among those who had completed high school. None of the participants reported having higher education.

Figure 4 - Photoprotection measures adopted according to the participants' levels of education.



Source: Prepared by the authors (2023).

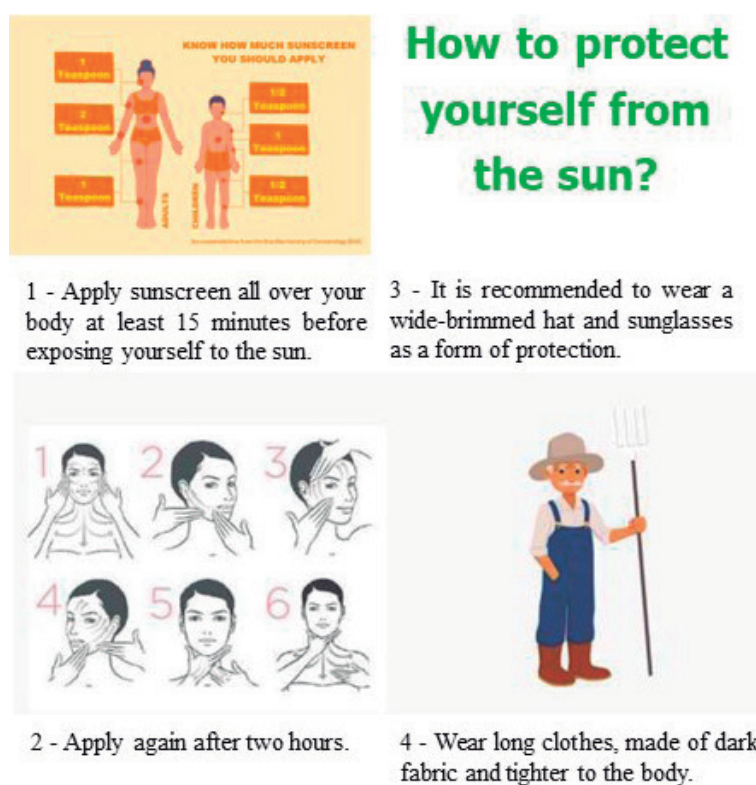
Nevertheless, when considering individuals who have already been diagnosed with skin cancer, the presence of the disease appears to have a greater impact on their awareness and adoption of photoprotection measures. When examining the use of sunscreen, 82% of individuals with a history of skin cancer adopt this measure, with hats (95%) and long clothing (68%) being the most popular choices. In contrast, only 27% of those interviewed mentioned using hats, and 41% mentioned using sunglasses.

The rural workers were asked about the SPF of the sunscreens they used, and the results were positive as per the recommendations of health agencies. The data collected revealed that none used products with an SPF below 30; 54% used products with an SPF between 30 and 50, 41% used products with an SPF between 50 and 70, and 4% used products with an SPF above 70. In terms of sunscreen reapplication frequency, 49% of those interviewed stated that they did not reapply the product, 36% stated that they reapplied it once a day, and only 15% reapplied it twice a day.

Lastly, we inquired about how many hours the workers spent in the sun each day. Across all age groups, the majority (47%) reported being exposed to the sun for 4-8 hours, followed by those who spent between 2-4 hours (33%), and those with less than 2 hours (19%). Only 1% of participants mentioned spending between 8-12 hours in the sun.

As a strategy to raise awareness among the interviewees about the importance of adopting sun protection measures, they were provided with an informational brochure (Figure 5). After reviewing the brochure, they were asked about their approval and understanding of the information presented, and all interviewees (100%) commented positively about the initiative.

Figure 5 - A snippet of the brochure on the main precautions for photoprotection given to the participants.



Source: Prepared by the authors (2023).

DISCUSSION

After carrying out the work, it was possible to understand the sun exposure and photoprotection habits of rural workers in Guaraciaba. This municipality, with a population of approximately 10,488 inhabitants, is primarily composed of descendants of Italian and German immigrants. Rural activity is a prominent source of employment and income generation in the area and mainly consists of small family-owned farms (GUARACIABA, 2018).

The predominance of volunteers aged over 50 can be attributed to the rural exodus of young people to urban centers. As reported by Zangrande *et al.* (2022), young individuals tend to migrate to urban areas in search of better living conditions, while older family members remain in rural areas. Therefore, the higher rate of elderly people in rural areas can directly be linked to this phenomenon.

The obtained data corroborates the latest data of the Agricultural Census conducted in 2017; the census indicated that out of the 15.1 million people working in agricultural establishments, 24.2% were aged 45-55, 23.5% were between 55-65, and 23.2% were over 65. In contrast, only 2% were under the age of 25. These findings confirm the assumption that individuals over 50 form the majority in agriculture, particularly in family farming (BRASIL, 2019). The prevalence of rural workers over 50 raises concerns, considering their prolonged sun exposure, particularly considering that the risk of skin cancer is directly proportional to the duration of sun exposure (BROWN *et al.*, 2021).

In terms of education level, 79% of the participants had only completed elementary school. A similar study by Silva and Sena (2017) found that most rural workers had low levels of education, with 54.28% having completed only up to the fourth year of elementary school. The challenges these individuals faced in accessing education should be considered, especially in the past when they prioritized assisting with family farming over their own studies, resulting in delayed education until adulthood (DALCIN *et al.*, 2021). Furthermore, the participants were asked about their knowledge of photoprotection, and 42% reported having satisfactory knowledge of the subject. In a similar study conducted by Dalcin *et al.* (2021) with the same target population, the authors found that most individuals had some knowledge on the subject and were aware of ways to prevent the disease. However, in practice, it was evident that many participants, despite their awareness, neglected photoprotection measures.

It is important to note that although most participants had a low level of education, with a large proportion having only completed elementary school (79%), many believed they had a satisfactory understanding of the subject. However, the subjectivity of this data should be considered, as the questionnaire does not provide insight into the true extent of their knowledge. This can only be observed by analyzing their daily sun exposure and photoprotection habits.

In this context, health professionals play a crucial role in health education. Within their scope of practice, they should strive to raise awareness among the population about the risks of skin cancer and inform them about the symptoms, diagnosis, and treatment of the disease. Given that skin cancer is one of the most prevalent types of cancer, it is critical to take these actions in order to reduce the number of cases, as well as morbidity and mortality rates (GÖL; ERKIN, 2018).

The participants were also asked if they had ever been diagnosed with skin cancer, and 14% of them reported having received such a diagnosis. Notably, 95% of these volunteers were over 50 years old, corroborating the literature, as the rate of skin carcinoma was higher in patients aged over 60 since they tend to have a more significant number of dermal lesions acquired over years of sun exposure (BOMFIM; GIOTTO; SILVA, 2018).

In addition to the increased risk of skin cancer associated with advancing age, individuals of Caucasian ethnicity also have a higher susceptibility to developing skin neoplasms. According to the phenotypic distribution in Brazil, the southern region of Brazil, which includes the municipality being studied, has over 80% of the population with fair skin due to the prominent presence of European immigration in the area (ZAPPELINI, 2022). Like other tissues, the skin experiences functional decline due to aging, and this decline is particularly accelerated by prolonged exposure to the sun. One of the consequences of this decline is a decrease in the effectiveness of DNA repair mechanisms, especially when the skin is exposed to mutagenic agents like UV radiation. Additionally, the increased accumulation of mutations is influenced by phenotypic factors, such as an individual's skin phototype (HERNANDO *et al.*, 2021).

Photoprotection is essential in preventing skin neoplasms. It involves measures to reduce sun exposure and prevent both acute and chronic damage caused by the sun (SBD, 2017). These measures include wearing sun-protective clothing, such as long clothing with UV protection, a wide-brimmed hat, a cap, and sunglasses, as well as using sunscreens (SBD, 2022). It is important to note that the effectiveness of photoprotection depends on adopting multiple measures, considering individual phenotypic characteristics, sun exposure habits, professional activity, geographical location, and family history of skin diseases (SBD, 2017). Therefore, healthcare professionals, including pharmacists, are qualified to provide guidance on disease prevention (SANTOS; SOBRINHO; OLIVEIRA, 2018).

Regarding adopting photoprotection measures, 52% of participants reported using sunscreen. Some participants who did not use it cited the product's liquid consistency and the associated eye discomfort as reasons. This aligns with the findings of Silva and Sena (2017), who surveyed 35 workers exposed to the sun and found that the majority (77.14%) did not use sunscreen. Reasons for non-adherence included discomfort during use and the suggestion for improved sensory aspects of the formulations. Additionally, some workers mentioned the high cost of sunscreens as a barrier to usage.

According to Moura *et al.* (2016), skin cancer is a serious public health problem, yet there is a lack of legislation related to its prevention. Government authorities should seek to pass laws or decrees that provide free access to sunscreens through the Brazilian public health system in order to increase their usage and facilitate access to other photoprotection measures.

As for the photoprotection measures adopted by the participants, 85% of them wore wide-brimmed hats, 60% wore long-sleeved clothing, and 52% used sunscreen. Similar results were reported by Cezar-Vaz *et al.* (2015) in Rio Grande do Sul State with 130 rural workers. They found that

57.7% of the participants used sunscreen, 81.3% wore straight-brimmed hats, 9.2% wore caps, 0.8% wore long-sleeved shirts, and 20% wore overalls. Therefore, it is evident that the use of long clothes and caps was much more popular among workers in Guaraciaba compared to workers in the study by Cezar-Vaz *et al.* (2015).

Regarding sunscreen use, Margotto *et al.* (2016) conducted a study in an essentially agricultural town in Rio Grande do Sul found that 60.74% of the participants used sunscreen as a photoprotection method. Nevertheless, 59.81% did not reapply the product throughout the day, and 55.14% only applied it to their face, thereby compromising the overall level of protection provided by the product. Additionally, 85.98% of respondents mentioned wearing a hat, while only 23.36% wore sunglasses.

According to the American Cancer Society (2019), sunscreen is a product that protects the skin from UV rays, although it is only a filter and cannot block all the rays, even when used correctly. Therefore, while it should be one of the measures used for photoprotection, it should not be the sole method relied upon. It is always recommended to choose sunscreens with UVA and UVB protection and an SPF above 30, as higher SPFs provide greater protection against UVB rays, which are the main cause of sunburn.

It is important to consider the manufacturer's instructions regarding the amount of product that should be applied to the skin. In addition to the SPF of the product, the level of photoprotection also depends on factors such as the amount applied, the distribution of the product on the skin, and the frequency of reapplication (SBD, 2017).

Sunscreens should be applied at least 15 minutes before sun exposure and generally reapplied every 2 hours. If there is contact with water, the product should be reapplied before the two-hour mark, even if it is waterproof. Furthermore, individuals who perspire excessively should avoid gel products, as they tend to come off more easily (SBD, 2022). With regard to the reapplication of sunscreen, 49% of the participants reported that they did not reapply the product throughout the day. According to the SBD (SBD, 2022), it is necessary to reapply sunscreen for it to be fully effective. Based on this, it can be concluded that nearly half of the interviewees disregard this guideline, ultimately compromising the product's effectiveness and putting their health at risk.

The interviewees were also questioned about the amount of time they spend in the sun, and a majority of them (47%) reported being exposed to the sun for 4-8 hours daily. As highlighted by Silva and Sena (2017), sun exposure is inherent to the occupation of rural workers and often occurs at inappropriate times. Therefore, it is essential to adopt photoprotection measures as recommended by health agencies. According to Cardoso *et al.* (2017), an average daily exposure of 6.4 hours to UV radiation has significant detrimental effects on workers' health, particularly if this exposure takes place during the critical hours between 9 am and 3 pm.

CONCLUSION

Our findings revealed that most of the municipality's rural population consists of individuals over 50 who have been working in the fields for more than 10 years and are exposed to the sun for roughly 4-8 hours per day. Based on this information, it is evident that this population is potentially at risk of developing occupational skin cancer or even experiencing a deterioration in their overall health, considering that cases of skin cancer have already been reported among these workers.

Upon analyzing the photoprotection habits adopted by the workers, several deficiencies were identified in terms of their adherence to and proper utilization of preventive measures. In light of this, it is crucial for healthcare professionals to prioritize providing these workers with comprehensive information regarding the dangers of excessive sun exposure and the importance of adhering to individual protective measures. Additionally, it is essential to classify these measures as personal protective equipment, as sun exposure is inherent to the nature of farmers' work activities, and the consistent implementation of these measures is indispensable for ensuring the well-being and health of the workers throughout their lives.

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