ORIGINAL ARTICLE

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PERSONAL PROTECTION EQUIPMENT AND OCCUPATIONAL SUN EXPOSURE IN VIEW OF THE CASHEW CULTIVIVATION WORKER'S HEALTH

EQUIPAMENTOS DE PROTEÇÃO INDIVIDUAL E EXPOSIÇÃO OCUPACIONAL SOLAR DIANTE DA SAÚDE DO TRABALHADOR DA CAJUCULTURA

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ABSTRACT

Objective: To evaluate the use of personal protective equipment and sun exposure among workers in the processing of cashew nuts and their derivatives. **Method**: This is a cross-sectional, quantitative, epidemiological research, carried out in the city of Barreira - CE, between December 2019 and May 2020. Data collection took place through anamnesis and the application of a semi-structured instrument which addressed the working conditions and sociodemographic aspects of these workers. Statistical data processing was performed using the PPE Info v. 7.2.1.0. This research was approved by the Ethics and Research Committee under the technical report number 3.466.070. **Results**: One hundred people participated in the study, predominantly male participants (66%). It was observed that sun exposure caused erythema in 23% of respondents. Regarding the use of personal protective equipment (PPE) during labor activity, 63% of respondents worn only one PPE, with a higher prevalence of wearing a long-sleeved shirt in 26% of the participants. Thus, it was possible to observe that the non-use of PPE and sun exposure due to work activities are considerable risk factors that can lead to serious consequences for workers' health, the occurrence of skin cancer being one of them. **Conclusion**: It is essential to rethink strategies in favor of the health of this group so that both the employee and the employer are aware of the Regulatory Norms that aim to support the work activity with cashew and its derivatives.

Keywords: Personal Protective Equipment. Occupational Exposure. Occupational Dermatitis. Occupational Health. Occupational Health Nursing.

RESUMO

Objetivo: Avaliar a utilização de equipamentos de proteção individual e a exposição solar entre trabalhadores que atuam no beneficiamento da castanha de caju e seus derivados. **Método:** Trata-se de uma pesquisa transversal, quantitativa, epidemiológica, realizada no município de Barreira – CE, no período entre dezembro de 2019 e maio de 2020. A coleta de dados deu-se por meio da anamnese e da aplicação de instrumento semiestruturado que abordou as condições laborais e aspectos sociodemográficos desses trabalhadores. O processamento estatístico dos dados foi realizado através do programa EPI Info v. 7.2.1.0. Essa pesquisa foi aprovada pelo Comitê de Ética e Pesquisa com parecer de número 3.466.070. **Resultados:** Participaram do estudo 100 pessoas, predominando participantes do sexo masculino (66%). Observou-se que a exposição solar acarretou, em 23% dos entrevistados, eritema. Sobre a utilização de equipamentos de proteção individual (EPI) durante a atividade laboral, 63% dos entrevistados utilizavam apenas um EPI, havendo uma maior prevalência da utilização de camisa de manga comprida em 26% dos participantes. Assim, foi possível observar que a não utilização de EPIs e a exposição solar devido à atividade laboral são fatores de risco consideráveis que podem levar a sérias consequências à saúde do trabalhador, como por exemplo a ocorrência de câncer de pele. **Conclusões:** É imprescindível repensar estratégias em prol da saúde desse grupo para que tanto o empregado como o empregador tenham conhecimento das Normas Regulamentadoras que visam amparar a atividade laboral com o caju e seus derivados.

Palavras-chave: Equipamento de Proteção Individual. Exposição Ocupacional. Dermatite Ocupacional. Saúde do Trabalhador. Enfermagem do Trabalho.

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INTRODUCTION

Family farming represents a strong presence in the context of agriculture in northeastern Brazil (82.6%)[1]. This reality is due to the need for rural producers to efficiently use the land and labor factors of their own family in economic activities that allocate them in the most rational way possible, aiming at family support and job generation for the population[2].

About 75% of these producers are made up of family farmers who owns areas smaller than 20 hectares, generating 250 thousand direct and indirect jobs annually. Cashew generates an even greater economic importance in the Northeast region because the harvest allows for an intercalation between other subsistence crops, such as rice, beans, cassava and corn[3].

Thus, the cultivation and marketing of cashew, also known as cashew farming, has been widespread in the Brazilian Northeast, both because it is an agricultural activity more conducive to regions with hot and dry climates, and because it is a fruit supplier of raw material for the manufacture of various by-products such as wood, nuts, cajuína – a soft drink made out of cashew meat – and cashew nut liquid (CNL)[4].

During 2016, the territorial occupation of cashew plantations in Brazil corresponded to 594 thousand hectares, with 99.4% of this total being concentrated in the Northeast region, with the state of Ceará as the main producer, with 384 thousand hectares (64.7%)[4-5]. Ceará state has the municipalities of Aracati, Aracoiaba, Beberibe, Bela Cruz, Cascavel, Itapipoca, Russas, Barreira and Pacajus as the main producers of cashew nuts. The latter two stand out as cashew and cashew kernel producing poles, with agglomeration of micro and small formal and informal agribusinesses. In Barreira, cashew farming is characterized as the main source of income, with production based on manual and semi-mechanized handling with exposure to the components of the CNL[4].

CNL is used as a base for coatings, electrical insulators, plasticizers for rubber, photo developers, inks, varnishes, enamels, abrasives and antioxidants. However, the main product of the Northeastern cashew industry is still the cashew nut (CN)[6]. The nuts, on the other hand, contain an enveloping film that is removed during processing, from which alkaloids and tannins are extracted. From the husk, a flammable caustic liquid is obtained, a by-product of the cashew agribusiness, the CNL, which constitutes approximately 25% of the total weight of the nut[7]. It has caustic and irritating properties that, in direct contact with the skin of workers, can cause irritation and chemical burns[8].

All the steps that make up this nut processing have several risks to the health of the workers, such as environmental exposure like dust, heat and cold, as well as aspects related to the activity itself such as almond frying, packaging and storage, in which it can

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having frequent contact with the CNL[8]. Constant exposure to ultraviolet rays without the correct use of preventive measures leaves workers vulnerable to the development of skin cancer[3].

Given the above, the adoption of biosafety measures in the work environment is a determining factor in the prevention of accidents and occupational diseases, with the use of personal protective equipment (PPE) being recommended by law, as well as the correct handling and supervision in their use, in addition to behavioral and organizational measures at work[9] .

Nursing, in turn, has a fundamental role in the context of preventing health problems for workers. For this to happen, it is important for the professional to be able to perform an active search, in addition to guiding and instigating the use of PPE[7].

In this sense, it was necessary to investigate the use of PPE and sun exposure among individuals who work with cashew nuts because, in addition to being a little explored topic in the literature, this work/production environment exposes the farmer to agents that can cause risks and harm to health.

METHODOLOGY

This is a cross-sectional study, carried out in the city of Barreira, in the state of Ceará, which was chosen due to the relevance of this city in the context of cashew cultivation. From December 2019 to May 2020. The study population was composed of individuals who practiced work activities of processing cashew nuts, pseudo fruit and derivatives.

The municipality has an estimated population of 22,425 inhabitants in 2019, with the majority in rural areas (58.48%), equitable gender distribution, with a slight majority in men (9,837 - 50.25%), with the main source of income being the processing of cashew nut and its derivatives and a considerable proportion of inhabitants in extreme poverty (4,560 - 23.3%)[5]. The study population consisted of individuals who practiced work activities of processing cashew nuts, pseudo fruit and derivatives.

The place of application of the data collection instrument was the Dermatosis Ambulatory, which operates at the headquarters of the Rural Producers Union of Barreira, a first-degree, non-profit union that covers about 20 mini nut factories. The Clinic has a waiting room and an office, according to the standards of the Unified Health System.

The study population was selected through the application of the methodological snowball sampling technique, according to which the initial study participant indicates three new participants who, in turn, point out new individuals, and so on, until the proposed objective[10] is reached.

The following inclusion criteria were used: individuals aged 18 years or over, who had skin lesions arising from contact with the CNL due to work activity related to the

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processing of cashew nuts, pseudo fruit and by-products. Individuals with any neurological impairment that made it impossible to understand the research objectives and presented skin lesions arising from other causes not associated with contact with the CNL were excluded, resulting in a sample of 100 individuals.

Initially, the dissemination of this research was broadcast on the local radio station as well as dissemination by health professionals and local chestnut producers, through the Union. Volunteers were invited to attend the clinic, bringing together people who had skin lesions and who performed activities directly related to contact with cashew, cashew nut and/or by-products.

The anamnesis was the first step in the diagnostic approach, with the collection of the history of the current disease, occupational history, activities performed in their free time, household chores, personal products and past history. Subsequently, in order to identify what remains ingrained in traditional cashew farming activities, pointing out the advances and permanence of traditional habits, two main variables relevant to the risk of the work activity associated with processing cashew and its by-products were analyzed using a standardized form applied in the field: the use of PPE and sun exposure.

In addition, sociodemographic variables corresponding to age, gender and education were addressed, as well as questions about risk factors and signs/symptoms resulting from sun exposure, time of exposure, and also the use of PPE during labor activity.

The database was built in a Microsoft Excel® 2016 spreadsheet and processed using the Statistical Program Epi Info, version 7.2.1.0 for Windows (CDC, Atlanta –USA). Descriptive statistics were calculated, including measurements of position and variability such as mean and standard deviation (sd) for numerical characteristics, in addition to absolute and relative frequencies suitable for categorical variables.

Ethical aspects were respected, complying with Resolution 466/12 of the National Health Council (NHC)[11]; with approval of the Ethics and Research Committee (ERC) of the Universidade da Integração Internacional da Lusofonia Afro-Brasileira, with technical report number 3.466.070.

RESULTS

One hundred people from 21 different locations in the municipality were interviewed, which showed a predominance of males (66 - 66%), mean age in both genders of 33.21 years, (sd ± 12.42), education, predominated participants who were not currently studying, these being 88% (n = 88) of respondents.

Regarding the characteristics due to sun exposure, most of the respondents do not have symptoms (47 - 47%), but it is worth

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mentioning that erythema in a place exposed to the sun (23 - 23%), a burning sensation (21 - 21%) and simultaneous symptoms (9 – 9%) were reported among the group. Workers who are not directly exposed to the sun, that is, working in covered areas, were predominant (41 - 41%).

Table 1 - Daily sun exposure time reported by workers in the cashew and its derivatives production sector, Barreira - Ceará, Brazil - 2020.

Daily sun exposure time	N	%
< 1 hour	45	45,0
Between 1 e 3 hours	12	12,0
Between 3 e 5 hours	02	2,0
No sun exposure	41	41,0

Source: Field research data (2020).

As for the time when the sun is exposed for the longest time, most do it during the period of the day when there is the highest incidence of sunlight in the area, between 8 am and 1 pm (52-52%), with most workers not exposed to the sun daily due to their work activity (41-41%).

Tables 02 and 03 present data on the amount of PPE used among respondents during the working hours. There was a predominance of workers who do not wear them (63%), which may have consequences. Table 03 was built from a multiple-choice question. For this reason, the percentage exceeds 100%, as a single respondent could wear more than one type of PPE.

Table 02 - Use of personal protective equipment reported by workers in the productive sector of processing cashew and its derivatives, Barreira - Ceará, Brazil - 2020.

Number of used PPEs	Nr	%
Only one	63	63%
Up to two	31	31%
Up to three	05	05%
Up to five	01	01%

Source: Field research data (2020).

Table 03 - Use of personal protective equipment for protection during work activity. Barrier - Ceará, Brazil - 2020.

Tipo de EPI	n	%
Long sleeved shirts	26	26%
Gloves	09	09%

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Cat/Hat	04	04%
Disposable apron	02	02%
Cloth tied around the head	01	01%
Pants	01	01%
Disposable mask	01	01%
Sunblock	01	01%
None	63	63%

Source: Field research data (2020).

The participants unanimously used detergent or soap after work, as well as lemon, which they reported to be useful to prevent the appearance of dark stains.

It is noteworthy that all respondents claimed to use vegetable oil during work activity to avoid burns due to contact with CNL. In addition, when CNL spills onto any part of the skin, workers immediately report using 70% alcohol to prevent further skin burns.

DISCUSSION

The male population prevailed, similar to another study that identified the majority of male workers (66.67%). With regard to the level of education, most respondents had a low level of education[12], which can justify the non-adherence to the use of PPE.

In regards to the characteristics found due to sun exposure, the presence of erythema prevailed, which is characterized by an inflammatory disorder that has effects on the skin and mucous membranes. It has no predilection for age or race, but it is more common in young adult males. Cutaneous manifestations, which are flat, round and dark red, initially appear on the extremities, with erythema and sunburn being commonly noted. The most striking cutaneous lesions of erythema are the circular and concentric erythematous rings in the shape of a target or a bull's eye[13-14].

As for the time of sun exposure, it was observed that most respondents stay up to two hours exposed to the sun per day, during the week (Monday to Friday), taking into consideration the journey to the work environment, a result also observed in Mato Grosso, Brazil[15].

Cashew nut production employees are also exposed to numerous occupational hazards in the work environment, including the adoption of forced postures due to manual and semi-mechanized work during nut cutting, as cashew nut processing requires intense use of labor. This attribute requires measures to prevent injuries, for this, workers should be provided with an appropriate PPE[16].

For this reason, the rural or equivalent employer must provide rural workers exposed to the sun with PPE such as a wide-brimmed

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hat or head bands, or other types of protection against the sun and rain, goggles against non-ionizing radiation and protection for the whole body, such as aprons, jackets, capes and overalls[17], in jobs where there is a danger of injuries caused by agents of thermal, biological, meteorological and chemical origin.

A study carried out in another Brazilian setting found that most of its respondents protect themselves from solar radiation wearing only a hat and/or cap as a form of protection (15 - 42.85%)[18]. It can be observed that the study points out exactly what was found in this research, that is, the vast majority wear only one type of personal protective equipment or do not wear it.

Handling the liquid from the nut shell becomes extremely harmful due to the fact that the nut contains a high oil content and the workers do not wear PPE, resulting in loss of their fingerprints. Therefore, the lack of essential instruments is harmful to physical conditions, in addition to the loss of fingerprints, burns to the hands caused by the oils contained in the chestnut, smoke inhalation due to the lack of protection in the nostrils, strong radiation from the heat of the fire and the position of the body in inadequate, low and small chairs, which result in future health problems[19].

Other studies show that the working conditions of the villages that handle the nut end up exposing workers to a situation of socio-environmental risk, which is often unhealthy and inappropriate for the well-being of workers and their families, as cashew nut, vegetable oil to protect the hands of workers who work in the cutting and/or frying stage of the almond[20-21] are necessary to obtain cashew nut almond.

The respondents claim that they do not wear gloves because the nut is not firm when they handle it, so it is replaced by the use of an oil[22]. This study shows that the use of vegetable oil stands out in relation to the use of gloves, a finding that meets the provisions of our research results. However, there are no studies that can prove the effectiveness of using vegetable oil for burns arising from the liquid of the chestnut shell. However, it is known that vegetable oil has an antioxidant capacity that represents part of the bioactivity of the components of vegetable oils[23].

As mentioned above, it is observed that this worker can experience situations of conflict arising from their labor process such as the certainty to guarantee their livelihood and that of their family on one hand, and the complications affecting their health and risk of death[24], on the other.

FINAL CONSIDERATIONS

From this study, it was possible to observe that most professionals do not wear PPE and are exposed to the sun and considerable risk factors due to their work activity that can lead to serious consequences to the workers' health, as the occurrence of skin cancer. Therefore, knowing that the

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agribusiness sector has undeniable relevance in the Brazilian Northeast, especially with regard to cashew farming. One must be aware of the repercussions on the workers' health in the area due to the numerous occupational risks.

So, it is essential to rethink the strategies in favor of the health of this group, with targeted actions so that these workers can protect themselves from solar radiation, as well as guidance provided on the use of personal protective equipment in work activities in order to avoid that future skin complications occur, with the objective to prevent diseases and promote health at work.

For this reason, it is essential that both the employee and the employer are aware of the Regulatory Standards that aim to support the work activity with cashew nuts, so that the employer can offer better working conditions and the employee also feel protected while performing their job. Therefore, the importance of the nurse as an educating agent, together with his team, is reaffirmed to perform actions that must go beyond the prevention of diseases. It is also necessary to work on changes in the attitude of the ones involved through lectures, training and workshops so that they can obtain quality of life.

It is noteworthy that the present study presented, as a limitation, the fact that it was not carried out by a multidisciplinary team. Professional interdisciplinarity, in this context, could provide an even more holistic investigation about the working conditions of workers related to cashew cultivation, as well as the dermatological clinical manifestations related to the occupational activity presented by this population.

Finally, further studies on the subject are suggested, given the scarcity of publications, mainly involving people who work with cashew nuts and by-products, as well as studies aimed at understanding the benefits and harms of prolonged use of vegetable oil brought to the worker's skin.

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Submission: 2021-06-09
Approval: 2021-10-17