

Activity Habits and The Malignancy Level of Basal Cell Carcinoma at Dr. Soetomo Hospital Surabaya from 2020 – 2022

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ABSTRACT

Background: Basal Cell Carcinoma (BCC) is the most common type of skin cancer. In most cases, Basal Cell Carcinoma predominantly occurs on the head and neck, but it can also develop in the body or extremities, although this is rare. The primary risk factor for Basal Cell Carcinoma is UVR (Ultraviolet Radiation) from sunlight. UVR can occur when the skin is exposed directly or indirectly to UV rays, especially in individuals with indoor or outdoor activity habits. **Objective:** This study aims to determine activity habits and the malignancy level of Basal Cell Carcinoma in patients at Dr. Soetomo Hospital Surabaya from 2020 – 2022. **Methods:** This research is a descriptive study with a retrospective approach, using medical record data from Dr. Soetomo Hospital Surabaya from 2020 – 2022. The sampling technique used was total sampling. Results: There were 71 Basal Cell Carcinoma subjects with outdoor activity habits, 43 of whom were affected by stage 2, while 28 subjects with indoor activity habits were affected by stage 1. **Conclusions:** This can be caused by several factors, such as the duration and intensity of activities that allow exposure to ultraviolet radiation, the speed of treatment when lesions appear, and the history of surgery.

Keywords: activity habits; malignancy level; basal cell carcinoma; ultraviolet radiation.

INTRODUCTION

Skin cancer can be classified into two main categories, namely melanoma and nonmelanoma skin cancer. Melanoma is a rare, dangerous, and deadly type of skin cancer. While nonmelanoma skin cancer (NMSC) is divided into two types, namely Basal Cell Carcinoma (BCC) and Squamous Cell Carcinoma (SCC) [1]. Basal Cell Carcinoma is the most common type of skin cancer. Basal cells are found at the very base of the epidermis layer and play an essential role in producing new skin cells by dividing and duplicating themselves. When new cell production by basal cells occurs, older skin cells will be pushed to the surface of the epidermis, and then the cells will die [2]. The incidence of BCC is increasing and represents around 70-80% of all types of skin carcinoma [3].

The incidence of BCC is higher in Asians who are geographically closer to the equator, so their UV exposure is very high [4]. In most cases, BCC occurs on the head and neck, but it can also appear on the body or extremities, although this is rare. BCCs form in the basal cells of the skin and are usually characterized by changes in the skin, such as growths or sores that don't heal quickly and appear as small, sometimes shiny bumps [5].

The main causative factor of Basal Cell Carcinoma is exposure to ultraviolet radiation (UVR). UVR is a form of electromagnetic waves that can generally be obtained from natural sources, such as the sun, or artificial sources, such as tanning beds. However, the most crucial source of UVR is sunlight. UVR has benefits for the body, one of which is to stimulate the body to produce vitamin D [6].

On the other side, UVR also has adverse effects if exposed to high levels, such as skin cancer [7]. Based on its wavelength, UVR is classified into three types, namely UVA (Ultraviolet A), UVB (Ultraviolet B), and UVC (Ultraviolet C). The ozone layer completely absorbs UVC, so it cannot reach the earth's surface [8]. UVA and UVB can penetrate the skin, but UVA can penetrate the dermis layer and is more constant throughout the year. Meanwhile, UVB only penetrates to the epidermis layer. UVA can also penetrate glass, so UVA is often called the strongest type of UVR [9]. However, UVB is more cytotoxic and mutagenic than UVA [10]. UVA can indirectly damage DNA by forming ROS (Reactive Oxygen Species) and causing immunosuppression. UVB can also cause immunosuppression and damage DNA directly if the DNA repair fails; then, it can cause a genetic mutation by the PTCH1, SMO, SUFU, and p53 genes [5]. BCC is one type of cancer that has the highest mutational burden [11]. The most common genetic mutation in BCC patients is PTCH1 [12]. So, immunosuppression and genetic mutations can cause cells to proliferate abnormally, increasing the risk of BCC. If not appropriately treated, BCC lesions will widen and damage the surrounding tissue [5].

BCC can occur if the skin is exposed to UVR directly or indirectly. So, the incidence of BCC can be related to the activity habits carried out by individuals, mainly if they are carried out for a long and intense period, such as when an activity has become a job or hobby for them. Activities are divided into two, namely indoors and outdoors. Indoor activities tend to be less exposed to UVR. However, individuals who engage in indoor activities can risk developing BCC, which can be caused by indirect UVR, such as through glass windows that can allow penetration of UVR rays that can damage DNA in the skin. This exposure is cumulative, which can then increase the risk of BCC over time, especially in individuals with other risk factors, such as advanced age or a history of previous high UV exposure [13]. However, if individuals who do outdoor activities are exposed to excessive UVR from sunlight, BCC can increase. UVR in outdoor workers is 2-3 times higher than in indoor workers [14]. The most dangerous UVR occurs between 10 am and 4 pm [15]. Therefore, research is needed on the activity habits of BCC subjects with the malignancy level of BCC. This study hopes to determine the distribution of BCC subjects at Dr. Soetomo Hospital, Surabaya, from 2020 – 2022 based on age, gender, and activity habits carried out by subjects with the malignancy level of BCC.

METHODS

This study is a descriptive study using a retrospective study approach in the form of secondary data from medical records at Dr. Soetomo Hospital, Surabaya, from 2020 – 2022. The population of this study was all BCC patients at Dr. Soetomo Hospital, Surabaya, from 2020 – 2022. This research sample used a total sampling technique from secondary data of patients who met the inclusion criteria; incomplete medical record data were excluded.

This research has been approved by the Health Research Ethics Committee of Dr. Soetomo Hospital, Surabaya, and has received a certificate of ethical feasibility (1674/LOE/301.4.2/VI/2024). All research data obtained from medical records at Dr. Soetomo Hospital, Surabaya, are confidential and known only to the author. The data received will also not be disseminated to anyone.

RESULTS

Based on secondary data from medical records of BCC patients at Dr. Soetomo Hospital, Surabaya, from 2020 – 2022, 71 subjects were obtained that met the sample criteria. The number of subjects with outdoor activity habits was 43 (60.6%), while those with indoor activity habits were 28 (39.4%). Data related to the subject's activity habits were obtained from the subject's medical records related to work and the subject's habit history. Data related to the malignancy level of BCC were obtained from the size of the lesion and metastasis in the results of the anatomical pathology examination that had been carried out.

Table 1 shows that out of 71 subjects with BCC, 49 were dominated by subjects aged >59 years, 20 subjects aged 19 – 59 years, and two subjects aged <19 years. Based on gender, BCC occurs more in females than males, with a total of 43 subjects, while there are 28 males. The highest malignancy level of BCC is at stage 1, with a total of 35 subjects, while stage 2 has 29 subjects, stage 3 has six subjects, and stage 4 has one subject. Based on activity habits, most subjects are outdoors, with a total of 43 subjects, while 28 subjects are indoors.

TABLE 1: Distribution of Research Subjects.

| Variable | Total (n=71) | Percentage (%) |
|---|--------------|----------------|
| Age | | |
| <19 years | 2 | 2.8 |
| 19 – 59 years | 20 | 28.2 |
| >59 years | 49 | 69 |
| Gender | | |
| Male | 28 | 39.4 |
| Female | 43 | 60.6 |
| Malignancy Level of Basal Cell Carcinoma | | |
| Stage 1 | 35 | 49.3 |
| Stage 2 | 29 | 40.8 |
| Stage 3 | 6 | 8.5 |
| Stage 4 | 1 | 1.4 |
| Activity Habits | | |
| Outdoor | 43 | 60.6 |
| Indoor | 28 | 39.4 |

TABLE 2: Distribution of Activity Habits and The Malignancy Level of Basal Cell Carcinoma.

| Malignancy Level of Basal Cell Carcinoma | Activity Habits | | Total |
|--|-----------------|-----------|-----------|
| | Outdoor | Indoor | |
| Stage 1 | 18 | 17 | 35 |
| Stage 2 | 21 | 8 | 29 |
| Stage 3 | 3 | 3 | 6 |
| Stage 4 | 1 | 0 | 1 |
| Total | 43 | 28 | 71 |

Table 2 shows that most BCC subjects have outdoor activity habits, with a dominant stage 2 of as many as 21 subjects, while in stage 1, there are 18 subjects; in stage 3, there are three subjects, and one subject has stage 4. Subjects with indoor activity habits are dominated by stage 1, with a total of 17 subjects, while in stage 2, there are eight subjects; in stage 3, there are three subjects, and none are affected up to stage 4.

DISCUSSIONS

Age

Based on age, the results obtained were that at the age of <19 years, there were two subjects (2.8%); at 9 – 59 years, there were 20 subjects (28.2%); and at >59 years, there were 49 subjects (69%). So, from the distribution of age characteristics in BCC subjects, the most affected subjects were >59 years old. According to research that has been conducted, as age increases, the risk of BCC increases, with the peak occurring in the 6th to 8th decades, significantly more often in patients who are >60 years old [12]. So, the research is in line with the result of this research, as the majority of subjects are >59 years old. However, in this research, BCC can also be found in ages <19 years, although only 2 out of 71 subjects. This could be due to several factors, one of which is that subjects aged <19 years are diagnosed with BCC and have a history of Xeroderma Pigmentosum (XP). Based on one study, patients with genetic predisposition, such as XP or Basal Cell Naevus Syndrome (BCNS), can cause BCC at an earlier age, even at age <20 years [16].

Gender

Data from medical records of BCC patients based on gender, the majority occurred in females, namely 43 subjects (60.6%), while in males, there were 28 subjects (39.4%). Several previous studies have shown that comparing the number of BCC patients in males and females was insignificant. Research conducted by Cameron showed that BCC occurs more often in males than females, namely (57%) [17]. Usually, BCC is said to occur mostly in males based on the work that men mostly do. However, this also does not rule out the possibility that it can happen in females who also do quite a lot of activities or work indoors or outdoors, as research conducted by Nicole and Florian shows that BCC is more common in females than males with a ratio of 2:1 [16].

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In this study, most patients' activity habits were outdoor, such as farmers, fishermen, traders, contractors, construction workers, and motorcycle drivers, so these jobs allow subjects to be exposed to UVR from sunlight continuously. While the majority of indoor activities, the subjects were housewives. Outdoor work has a risk of 2 – 3 times higher when compared to indoor work [14]. Based on research that has been conducted also shows that the risk factor that has a reasonably high influence on BCC is exposure to sunlight [16]. Although UVR from sunlight has many benefits, on the other hand, UVR can increase the risk of BCC [7]. UVR is a major carcinogenic factor in the development of BCC because it can increase uncontrolled skin replication, especially UVB, which is the most significant risk factor for the development of BCC [18]. Not only UVB but UVA can also increase the risk of developing BCC, although it is pretty rare [19]. Meanwhile, UVC is the most dangerous and radioactive UVR, but it is entirely absorbed by the ozone layer so UVC cannot reach the earth's surface [20]. Continuous exposure to UV rays can cause a higher risk of developing BCC, especially in the head and neck [21]. This study also found that most occurred in the head and some in the neck. Around 10 am to 4 pm are hours vulnerable to exposure to sunlight and are the most dangerous because they can increase the risk of BCC [4]. Outdoor work, such as farming, fishing, contractors, construction workers, and motorcycle drivers, which are mainly carried out during these vulnerable hours, primarily if carried out for a long duration, results in an even higher risk [22].

Suppose someone does activities that allow exposure to UVR for a long and intense period. In that case, it will increase the risk of BCC, which will then cause lesions to become more expansive and damage the surrounding tissue if not treated properly. In this study, the majority of BCC subjects who had outdoor activity habits were dominated by stage 2 (measuring >2 cm and not metastasizing or not spreading to nearby lymph nodes or organs). In comparison, indoor activity habits were dominated by stage 1 (measuring ≤ 2 cm and not metastasizing or not spreading to nearby lymph nodes or organs) [23]. According to previous research, BCC is the most common type of skin cancer but has slow growth and rarely metastasizes, but usually multiple [24]. The results of this study also show that BCC mostly has multiple lesions, so it can also appear in other areas.

In the results of this study, subjects with outdoor activity habits were mostly affected by stage 2, while subjects with indoor activity habits were mostly affected by stage 1. This can be caused by several factors, such as the duration and intensity of activities that can be exposed to ultraviolet radiation, the speed of treatment when lesions appear, and the history of surgery that has been performed by the majority of subjects to treat BCC lesions so that they do not spread further.

In addition, this can also occur because BCC has slow growth and rarely metastasizes, so BCC is quite rare to become malignant [24].

CONCLUSIONS

Based on the results of this research, BCC mostly occurs in subjects aged >59 years (69%) and females (60.6%). The habit of activities mostly done by subjects is outdoor, with the majority affected by stage 2, while most are affected by stage 1 indoors. The most common occupation of the subjects is farmers. BCC's malignancy level can be caused by several factors, such as the duration and intensity of activity, the speed of treatment when lesions arise, and a history of surgery.

ACKNOWLEDGMENT

The author would like to thank all the supervising lecturers and institutions that have provided facilities in completing this research.

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