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CLINICAL AND HISTOPATHOLOGICAL CHARACTERISTICS OF BASAL CELL CARCINOMA AT DR. MOEWARDI HOSPITAL INDONESIA

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Abstract

Background:
Basal cell carcinoma (BCC) is the most common malignant skin tumor worldwide, with increasing incidence and limited epidemiological data in Indonesia, particularly in tertiary care settings. This study aimed to describe the demographic characteristics, anatomical distribution, and histomorphological patterns of BCC among hospitalized patients at Dr. Moewardi General Hospital, Surakarta, from 2021 to 2023.
Methods:
A retrospective descriptive study was conducted using medical records and histopathology reports of all hospitalized patients with confirmed BCC from January 2021 to December 2023. Total sampling was applied. Variables included age, sex, occupation, education level, anatomical lesion location, and histological subtype. Data were analyzed using descriptive statistics. Ethical approval was obtained from the Health Research Ethics Committee (013/I/HREC/2026), and the study adhered to the Declaration of Helsinki.
Results:
A total of 115 cases were identified, with a mean age of 64.3 ± 11.7 years. Most patients were aged 61–80 years (75%), and females comprised 55.7%. Farmers were the most common occupation (25.2%), and 52.2% had primary education. Lesions predominantly occurred in facial regions (91.7%), especially the nasal (33.0%), orbital (18.3%), and infraorbital areas (12.2%). Nodular BCC was the most frequent subtype (41.7%), while aggressive variants accounted for 29.5%.
Conclusion:
BCC predominantly affects elderly individuals with significant sun exposure and lower educational levels. The high proportion of facial lesions and aggressive subtypes highlights the importance of early detection and comprehensive histopathological evaluation in tertiary healthcare settings.

Keywords: Basal Cell Carcinoma; Skin Neoplasms; Histopathology; Retrospective Study; Indonesia.

Introduction

Basal cell carcinoma (BCC) is a malignant cutaneous tumor originating from the basal layer of the epidermis and characterized by progressive local tissue invasion. Although the growth pattern of BCC is generally slow and the metastatic potential is extremely low, the tumor frequently demonstrates locally destructive behavior that may result in significant functional and cosmetic impairment, particularly when diagnosis is delayed (1). As the most common type of skin malignancy worldwide, BCC represents a substantial clinical burden despite its relatively low mortality rate (2).
Globally, the incidence of BCC continues to increase, with epidemiological reports indicating an approximate annual rise of 10% (1). In the United States, more than 4.3 million new cases are estimated to occur each year. While BCC is more prevalent in Europe and North America, the disease is increasingly reported in Asia and South America. It accounts for approximately 65–75% of all skin cancers among fair-skinned populations and 20–30% among Asian populations. Nevertheless, epidemiological data from Asian countries, including Indonesia, remain limited and fragmented. A previous report from the dermatology and venereology outpatient clinic at Dr. Moewardi General Hospital documented a prevalence rate of approximately 0.0091% in 2022 (3).
Multiple environmental, phenotypic, and genetic factors contribute to the development of BCC. Established risk factors include Fitzpatrick skin types I–II, ultraviolet (UV) radiation exposure, childhood sunburn, family history of skin cancer, chronic immunosuppression, use of photosensitizing drugs, ionizing radiation, and exposure to chemical carcinogens such as arsenic (4). Among these factors, chronic UV exposure is considered the most significant etiological contributor. Approximately 70–80% of BCC lesions develop in sun-exposed regions,

particularly the face, neck, and scalp. The disease is most commonly diagnosed in elderly individuals, and age is regarded as an independent risk factor, with nearly 90% of patients aged ≥60 years. However, an increasing number of cases have been observed among younger individuals, suggesting changing exposure patterns and lifestyle influences.

At the molecular level, BCC pathogenesis is closely associated with cumulative DNA damage induced by ultraviolet radiation and age-related decline in biological repair mechanisms. Reduced DNA repair capacity, impaired immune surveillance, and chronic inflammation contribute to carcinogenesis (1,5). The disease is primarily linked to dysregulation of the Hedgehog signaling pathway, which plays a central role in epidermal cell proliferation and differentiation. Mutations involving the PTCH1 tumor suppressor gene, activation of the smoothened (SMO) gene, loss of suppressor of fused (SUFU), and ultraviolet-induced p53 alterations have been implicated in tumor development.

Clinically, BCC presents with a wide range of morphological manifestations, making histopathological examination essential for definitive diagnosis. The classic presentation is a slowly enlarging translucent or pearly nodule with surface telangiectasia and possible ulceration. The nodular subtype is the most frequently encountered variant. Although metastasis is rare, untreated lesions may invade surrounding structures, especially in the facial, cranial, and cervical regions, leading to substantial morbidity.

Despite the increasing incidence of BCC, comprehensive descriptive data regarding its clinical characteristics and histopathological patterns in Indonesia remain scarce. Most available studies are limited to outpatient settings or specific departments, which may not fully represent clinically significant cases requiring hospitalization. Therefore, a detailed evaluation of BCC profiles based on inpatient data is essential to better understand the epidemiological and clinicopathological characteristics of the disease in the Indonesian population.

This study aims to describe the demographic characteristics, anatomical distribution, and histomorphological patterns of basal cell carcinoma among hospitalized patients treated in the dermatology and venereology, surgical oncology and plastic surgery, otorhinolaryngology, ophthalmology departments, and the anatomical pathology laboratory at Dr. Moewardi General Hospital, Surakarta, during the period from January 2021 to December 2023.

METHODS

This study employed a retrospective descriptive observational design to investigate the epidemiological and clinicopathological characteristics of basal cell carcinoma (BCC) among hospitalized patients over a three-year period from January 2021 to December 2023. The retrospective approach was selected because it allows comprehensive evaluation of existing clinical and histopathological records without direct intervention, thereby ensuring that real-world clinical patterns can be documented accurately and systematically (6,7). As a non-interventional study, no randomization, pairing, blinding, placebo-control, or comparative allocation was applied, and all data were obtained from routine medical services. This design is widely recognized as appropriate for epidemiological profiling and clinical pattern identification in dermatological oncology research, particularly when exploring disease distribution across time and clinical units (8). The study aimed to provide a comprehensive descriptive overview of demographic characteristics, lesion distribution, and histomorphological subtypes rather than to test causal relationships or treatment outcomes (9).

The research was conducted at Dr. Moewardi General Hospital, Surakarta, a tertiary referral public hospital that serves as a major center for dermatologic, oncologic, and reconstructive surgical services in Central Java, Indonesia. Data were collected from multiple clinical departments involved in the management of skin malignancies, including Dermatology and Venereology, Surgical Oncology and Plastic Surgery, Otorhinolaryngology, Ophthalmology, and the Anatomical Pathology Laboratory. Ethical approval for this study was granted by the Health Research Ethics Committee of Dr. Moewardi General Hospital with clearance number 013/I/HREC/2026, confirming that the research fulfilled ethical standards for studies involving human medical record data.

The use of hospital-based clinical records allowed for the identification of real clinical cases that reflect the actual burden of BCC within the healthcare system, which is essential for understanding patterns of disease occurrence in referral hospitals (10). Patient selection was conducted through systematic screening of archived medical records, and only cases with confirmed histopathological diagnosis of basal cell carcinoma were included to ensure diagnostic accuracy and reliability.

The inclusion criteria consisted of patients diagnosed clinically with basal cell carcinoma who underwent histopathological confirmation and received treatment or hospitalization during the study period between January 2021 and December 2023. Patients with incomplete medical records, unclear clinical data, or absence of histopathological verification were excluded from the analysis to maintain data validity and consistency. The initial sample frame included all suspected BCC cases identified in hospital records, and a total sampling method was applied to ensure that every eligible patient meeting the inclusion criteria was included in the study. This sampling approach is commonly used in retrospective epidemiological studies to enhance representativeness and

reduce selection bias when population size is limited (11). The final dataset therefore reflected the actual distribution of confirmed BCC cases recorded in the hospital during the defined time frame.

Data collection procedures were carried out by reviewing medical records and pathology reports stored in hospital databases and archives. The diagnosis of basal cell carcinoma was confirmed through histopathological examination performed in the Anatomical Pathology Laboratory, ensuring that all included cases met diagnostic standards. The extracted variables included demographic characteristics such as age, sex, occupation, and education level, as well as clinical parameters including department of treatment, anatomical location of lesions, and histomorphological subtype classification. The anatomical distribution of lesions was categorized based on facial aesthetic units described in previous dermatologic surgical studies, enabling standardized mapping of tumor location across facial regions (12). Since this study relied on routine clinical data, no additional medical interventions were performed, and all observations reflected real clinical management practices in the hospital setting (4,5).

The methodological evaluation focused on categorizing variables into structured clinical and demographic groupings to facilitate comprehensive descriptive analysis. Anatomical lesion locations were classified based on recognized facial aesthetic unit systems to ensure consistency in interpretation, while histomorphological subtypes were categorized into low-risk (non-aggressive) and high-risk (aggressive) variants according to pathology reports. This classification approach is important for identifying clinically significant patterns that may influence disease progression and management strategies in dermatologic oncology (1,13). By organizing the data into standardized categories, the study aimed to provide a clear overview of clinical characteristics and disease distribution among hospitalized patients with basal cell carcinoma.

Statistical analysis was performed using descriptive methods because the data were categorical in nature and the primary objective was to describe epidemiological and clinical patterns rather than to test hypotheses or establish causal relationships. The results were presented as frequency distributions and percentages to illustrate the profile of basal cell carcinoma based on demographic variables, anatomical distribution, and histopathological subtypes. A total sampling technique was applied to ensure that the analyzed sample represented the entire population of eligible patients during the study period, thereby strengthening the reliability of the descriptive findings. Descriptive statistical approaches are widely recommended in retrospective clinical studies to provide an accurate overview of disease characteristics and distribution patterns, particularly in hospital-based research settings (14,15). The processed data were then organized into tables and graphical representations to enhance clarity and facilitate interpretation of epidemiological trends and clinical characteristics observed in the study population.

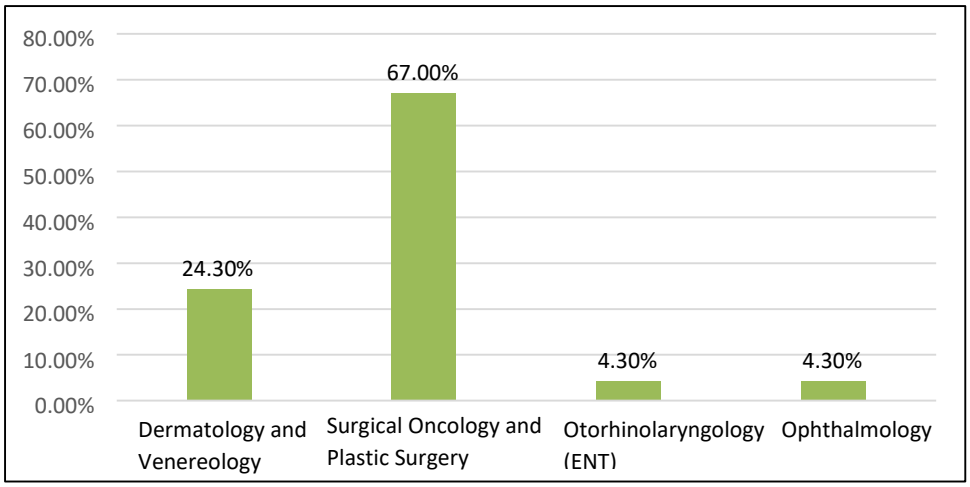
RESULTS

Overview of Study Population and Clinical Distribution

During the three-year study period from January 2021 to December 2023, a total of 115 confirmed cases of basal cell carcinoma (BCC) were identified from the combined records of the dermatology and venereology, surgical oncology and plastic surgery, otorhinolaryngology, and ophthalmology departments at Dr. Moewardi General Hospital, Surakarta. This hospital-based sample represents patients with clinically significant disease requiring hospitalization or specialized surgical management, in contrast to previous outpatient-based studies from the same institution (3).

The distribution of cases across clinical departments demonstrated distinct patterns of referral and treatment allocation (Figure 1). The majority of patients (67.0%, n=77) were managed in the surgical oncology and plastic surgery department, indicating that a substantial proportion of cases required operative intervention. This finding is consistent with the observation that many BCC patients present at advanced stages necessitating definitive surgical treatment. The dermatology and venereology department managed 28.7% (n=33) of cases, while smaller proportions were treated in the otorhinolaryngology (3.5%, n=4) and ophthalmology (0.9%, n=1) departments, reflecting the anatomical distribution and complexity of lesions requiring specialized surgical expertise.

Figure 1. Percentage distribution of BCC patients across clinical departments at Dr. Moewardi General Hospital (January 2021–December 2023)



As illustrated in Figure 1, the surgical oncology and plastic surgery department managed the largest proportion of BCC cases, followed by the dermatology and venereology, otorhinolaryngology, and ophthalmology departments, reflecting the anatomical complexity and surgical requirements of the referred lesions.

The overall prevalence of BCC among the total inpatient population during the study period was calculated as 115 cases out of 130,155 total admissions, representing approximately 0.088% of all hospitalized patients (Table 1). While this percentage may appear relatively low, it reflects the fact that BCC is primarily managed on an outpatient basis in many cases, with hospitalization reserved for patients requiring complex surgical procedures, extensive reconstruction, or management of advanced disease. The hospital-based prevalence observed in this study is therefore expected to be substantially lower than community-based incidence rates, as it captures only the subset of patients requiring inpatient care.

Table 1. Comparison between total inpatient population and number of BCC patients (2021–2023)

Year	Total Inpatients	BCC Patients	Prevalence (%)
2021	43,385	30	0.069
2022	43,385	40	0.092
2023	43,385	45	0.104
Total (2021–2023)	130,155	115	0.088

Table 1. Comparison between total inpatient population and number of BCC patients (2021–2023). The table shows the annual distribution of BCC cases among the total hospitalized patient population at Dr. Moewardi General Hospital. The overall prevalence of 0.088% reflects that BCC is primarily managed on an outpatient basis, with hospitalization reserved for patients requiring complex surgical procedures, extensive reconstruction, or management of advanced disease.

As presented in Table 1, Annual case distribution demonstrated a progressive increase over the three-year observation period. In 2021, 30 patients were diagnosed with BCC, representing 26.1% of the total study population. This number increased to 40 patients (34.8%) in 2022 and further to 45 patients (39.1%) in 2023. The rising trend may reflect several factors, including improved detection and referral patterns, enhanced diagnostic capacity, increasing public awareness of skin lesions, or a genuine increase in disease incidence. This temporal pattern warrants careful interpretation, as hospital-based data may be influenced by changes in healthcare-seeking behavior, referral practices, and institutional capacity over time.

Demographic Characteristics

The demographic and clinical characteristics of the study subjects are summarized in Table 2, which presents the distribution of patients by treating department, age group, gender, occupation, and educational level.

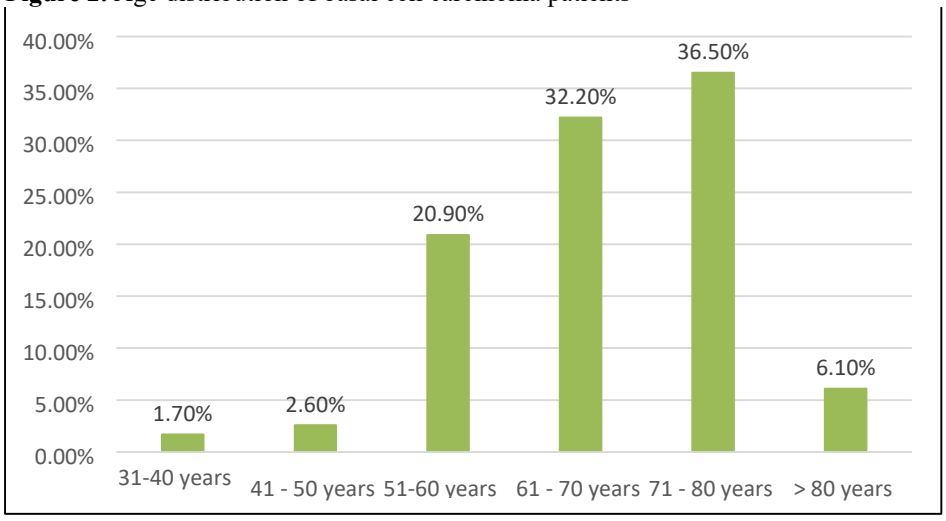
Table 2. Characteristics of Study Subjects

Category	Subcategory	F	%
Number of KSB Patients in the Polyclinic	Dermatology and Venereology	28	24.3%
	Oncology and Plastic Surgery	77	67.0%
	ENT (Otorhinolaryngology)	5	4.3%
	Ophthalmology	5	4.3%

Age	31–40 years	2	1.7%
	41–50 years	3	2.6%
	51–60 years	24	20.9%
	61–70 years	37	32.2%
	71–80 years	42	36.5%
	> 80 years	7	6.1%
Gender	Female	64	55.7%
	Male	51	44.3%
Occupation	Civil servant	1	0.9%
	Teacher	1	0.9%
	Laborer	14	12.2%
	Freelance worker	1	0.9%
	Trader/Entrepreneur	19	16.5%
	Farmer	29	25.2%
	Housewife	25	21.7%
	Unemployed/Retired	16	13.9%
	Private employee	9	7.8%
Education Level	No formal education	19	16.5%
	Elementary school	60	52.2%
	Junior high school	12	10.4%
	Senior high school	21	18.3%
	Diploma	1	0.9%
	Bachelor's degree	2	1.7%

As shown in Table 2, age distribution analysis revealed that BCC in this study population predominantly affected elderly individuals, with a mean age of 64.3 ± 11.7 years and a range from 32 to 92 years (Figure 2). The age pattern showed a clear concentration in older age groups, with the 61–70-year category comprising the largest proportion (36.5%, n=42), followed closely by the 71–80-year group (30.4%, n=35). The 51–60-year age group accounted for 16.5% (n=19) of cases, while the 81–90-year category represented 8.7% (n=10) of the study population. Younger age groups showed progressively lower representation, with 5.2% (n=6) of cases in the 41–50-year range and only 2.6% (n=3) in the 31–40-year category. No cases were identified in individuals younger than 30 years during the study period.

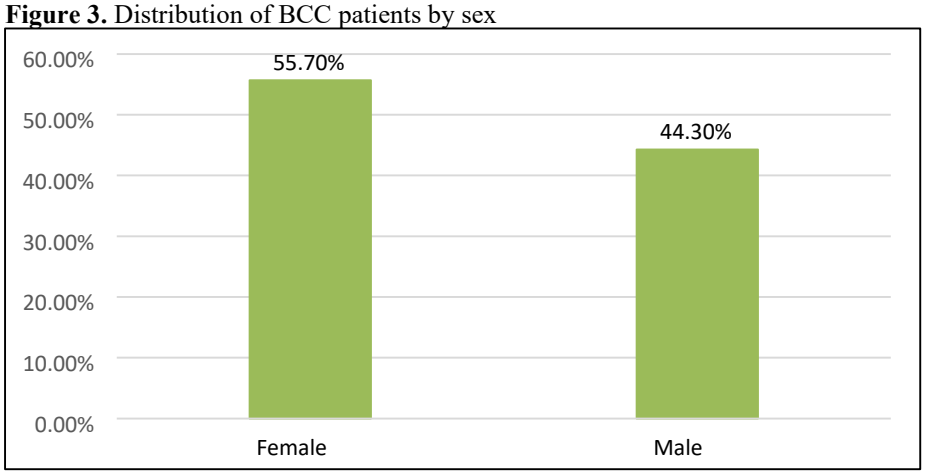
Figure 2. Age distribution of basal cell carcinoma patients



As illustrated in Figure 2, this age distribution pattern demonstrates that nearly 85% of cases occurred in patients aged 51 years or older, with approximately 75% of all cases concentrated in the 61–80-year age range. The predominance of elderly patients is consistent with the established understanding that BCC risk increases substantially with cumulative ultraviolet exposure and age-related decline in DNA repair mechanisms (1,5). The relatively low proportion of cases in individuals younger than 50 years suggests that in this hospital-based population, BCC remains primarily a disease of older adults, although the presence of cases in the fourth and fifth decades indicates that younger individuals are not completely exempt from risk.

Gender distribution analysis revealed a slight female predominance, with 64 female patients (55.7%) compared to 51 male patients (44.3%), yielding a female-to-male ratio of approximately 1.25:1 (Figure 3). This relatively balanced sex distribution differs from some epidemiological patterns reported in Western populations, where male predominance is more commonly observed. The slight female preponderance in this study may reflect several factors, including differences in healthcare-seeking behavior, occupational exposure patterns, or sociocultural influences on medical consultation for facial lesions.

Figure 3. Distribution of BCC patients by sex

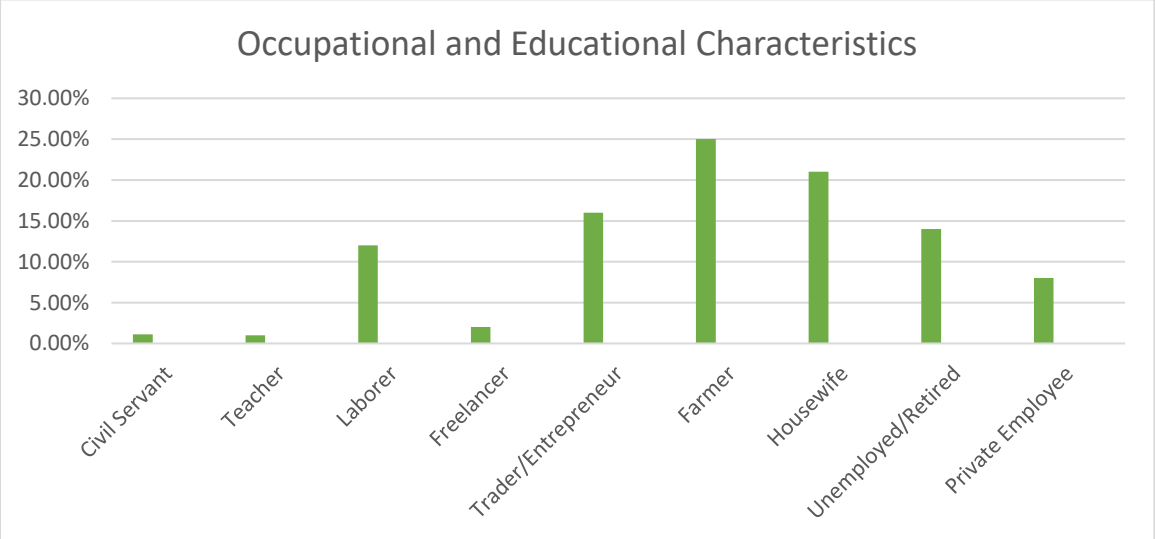


As shown in Figure 3, the female-to-male ratio of approximately 1.25:1 indicates a modest but consistent female predominance among BCC patients in this hospital-based population.

Occupational and Educational Characteristics

Occupational distribution analysis demonstrated that the largest proportion of patients were farmers (25.2%, n=29), followed by housewives (21.7%, n=25), reflecting the demographic and economic characteristics of Central Java, Indonesia (Figure 4). Retired individuals comprised 13.9% (n=16) of the study population, while civil servants and private sector employees accounted for 13.0% (n=15) and 10.4% (n=12), respectively. Self-employed individuals represented 8.7% (n=10), and laborers constituted 7.0% (n=8) of cases. The high proportion of farmers and outdoor workers is particularly noteworthy, as these occupations involve chronic exposure to ultraviolet radiation, which is recognized as the most significant etiological factor in BCC development (4).

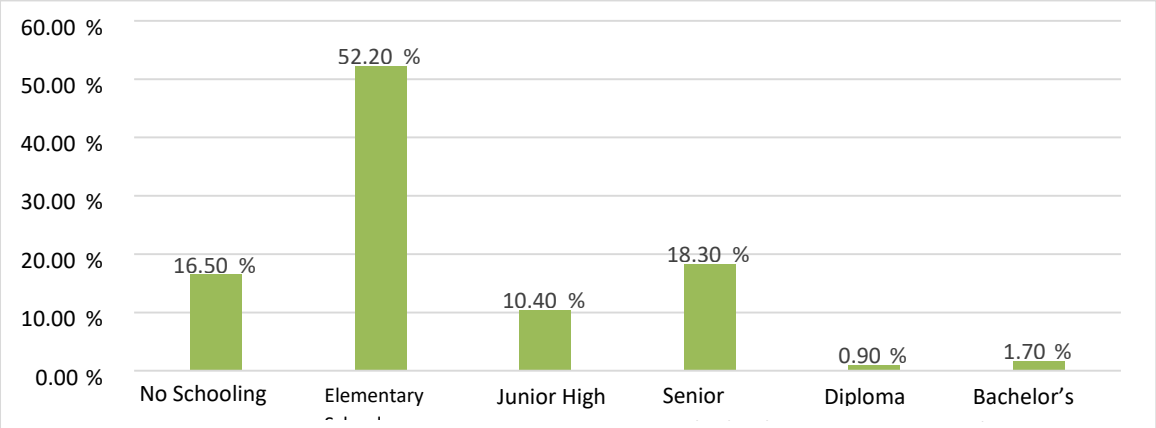
Figure 4. Distribution of BCC patients by occupation



As shown in Figure 4, the predominance of agricultural workers and housewives in this study population suggests that occupational and lifestyle-related sun exposure patterns may play an important role in BCC risk in the Indonesian context. Many agricultural activities in Central Java involve prolonged outdoor work with limited use of sun protection measures, potentially contributing to cumulative UV exposure over decades. Similarly, housewives in rural and semi-urban settings may engage in outdoor domestic activities, including food preparation, laundry, and agricultural support work, leading to substantial sun exposure.

Educational level analysis revealed that the majority of patients had completed only primary school education or less (Figure 5). This distribution may be associated with lower health literacy, reduced awareness of sun protection practices, delayed recognition of suspicious skin lesions, and limited access to preventive dermatologic care. The association between lower educational attainment and higher BCC case representation suggests potential disparities in health knowledge and preventive behaviors that could influence disease risk and presentation patterns.

Figure 5. Distribution of BCC patients by education level

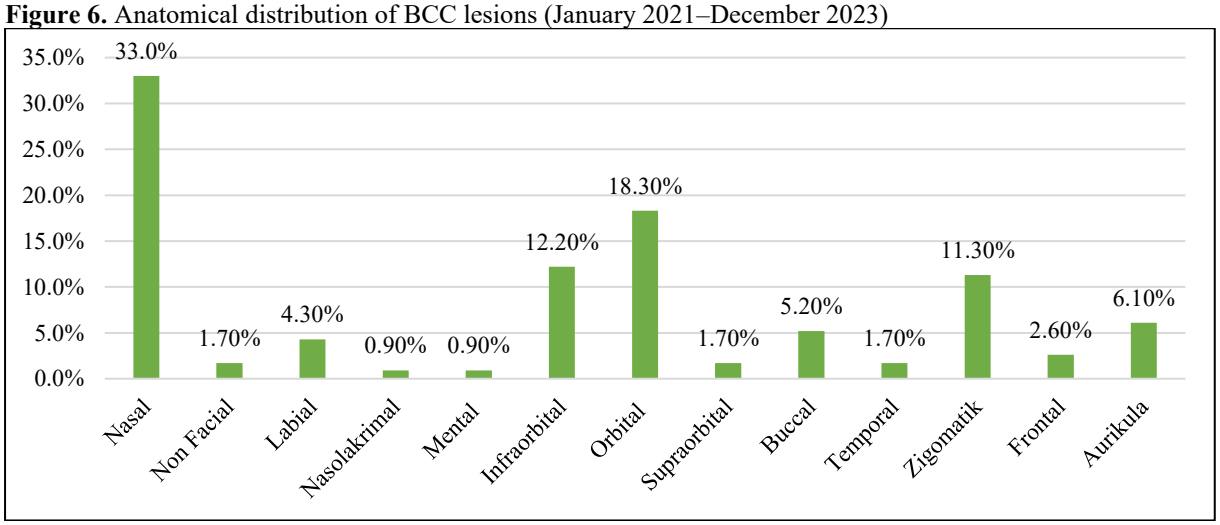


As illustrated in Figure 5, the majority of patients had limited formal education, with elementary school attainment being the most frequent educational category among BCC patients, consistent with the hypothesis of reduced health literacy in this population.

Anatomical Distribution of Lesions

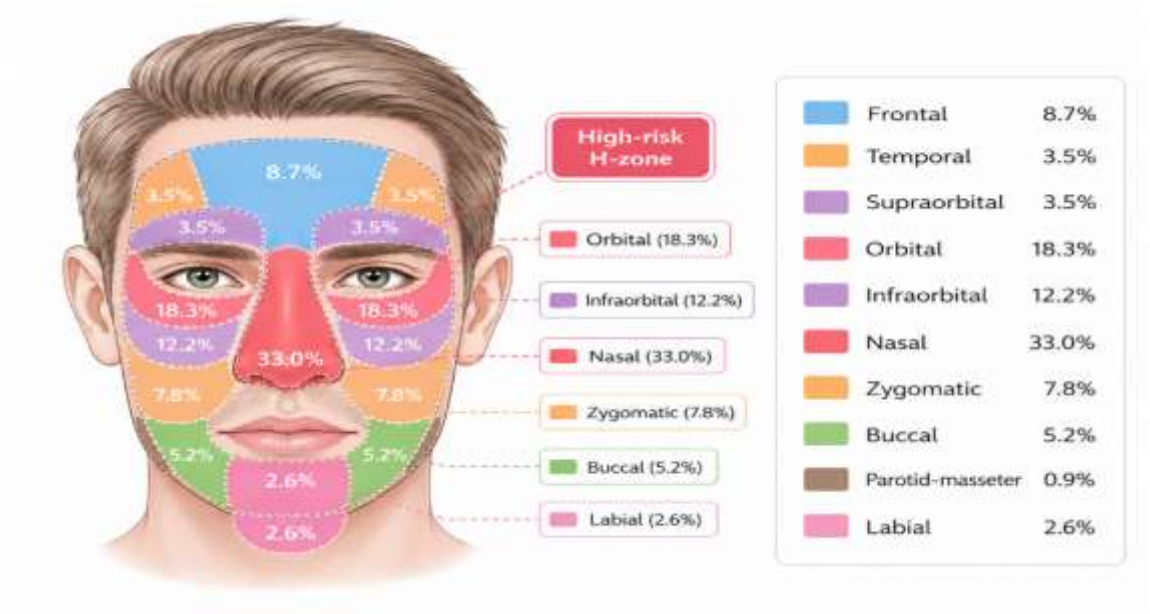
Anatomical distribution analysis demonstrated that BCC lesions were overwhelmingly located in facial regions, with distinct concentration in specific aesthetic and functional units (Figure 6). The nasal region was the most frequently affected anatomical site, accounting for 33.0% (n=38) of all cases. This was followed by the orbital region with 18.3% (n=21), infraorbital area with 12.2% (n=14), and zygomatic region with 11.3% (n=13). Less common locations included the auricular region (7.8%, n=9), buccal area (6.1%, n=7), labial region (5.2%, n=6), frontal zone (4.3%, n=5), and temporal area (3.5%, n=4). Non-facial locations collectively represented only 8.3% (n=9) of cases, underscoring the strong predilection of BCC for sun-exposed facial areas.

Figure 6. Anatomical distribution of BCC lesions (January 2021–December 2023)



As shown in Figure 6, the nasal, orbital, and infraorbital regions collectively represented the most frequently affected anatomical sites, underscoring the predilection of BCC for centrally located, sun-exposed facial areas. The distribution of lesions according to standardized facial aesthetic units is further illustrated in Figure 7, which maps the anatomical sites onto these subunits.

Figure 7. Facial distribution of BCC lesions by aesthetic units



Nasal region (33.0%) was most common, followed by orbital (18.3%) and infraorbital (12.2%) regions. The high-risk H-zone (central face) accounted for 63.5% of cases. The marked predominance of lesions in the central facial region, particularly the nose, periorbital area, and infraorbital zone, is consistent with established patterns of chronic UV exposure. These anatomical sites correspond to the most prominent areas of facial convexity, which receive maximum direct solar radiation during outdoor activities. The concentration of lesions in these regions aligns with previous epidemiological data indicating that approximately 70–80% of BCC lesions occur in the head and neck region due to cumulative sun exposure (1).

The high frequency of nasal BCC (33.0%) is particularly significant from both oncologic and reconstructive perspectives. The nose represents a complex three-dimensional structure with multiple aesthetic subunits, limited tissue laxity, and critical functional requirements for respiration and olfaction. Lesions in this location often require sophisticated surgical techniques to achieve both complete tumor excision and acceptable cosmetic outcomes. Similarly, the substantial proportion of orbital (18.3%) and infraorbital (12.2%) lesions presents unique challenges due to proximity to critical ocular structures, limited tissue mobility, and high aesthetic visibility.

The distribution across facial aesthetic units also reveals clinically important patterns. When categorized according to facial aesthetic zones, the majority of lesions (91.7%, n=106) occurred in facial locations, with only 8.3% (n=9) arising in non-facial sites such as the scalp, trunk, or extremities. Within facial locations, central facial structures (nasal, orbital, infraorbital, and labial regions) collectively accounted for 68.7% of all cases, while lateral and peripheral facial zones (zygomatic, auricular, buccal, temporal, and frontal regions) represented 31.3% of facial lesions.

This anatomical distribution pattern has important implications for treatment planning and resource allocation. The high concentration of lesions in cosmetically and functionally sensitive central facial regions necessitates access to specialized surgical expertise, advanced reconstructive techniques, and multidisciplinary collaboration to optimize both oncologic control and aesthetic outcomes. The relatively low frequency of non-facial BCC in this hospital-based population may reflect referral patterns, as facial lesions are more likely to prompt medical consultation due to visibility and cosmetic concerns.

Histomorphological Characteristics

Histomorphological examination of biopsy specimens revealed diverse histological subtypes with varying biological behaviors and clinical implications Table 3. The nodular subtype was identified as the most common variant, representing 41.7% (n=48) of all cases. This histological pattern is generally classified as a low-risk, non-aggressive subtype associated with relatively well-defined tumor margins and favorable treatment outcomes when managed with adequate surgical excision.

Table 3. Histomorphological Characteristics of BCC

Histological Subtype	Frequency (n)	Percentage (%)	Risk Category
Nodular	48	41.7	Low-risk (non-aggressive)
Nodular-infiltrative	17	14.8	High-risk (aggressive)
Not specified	21	18.3	Unknown
Other mixed patterns	12	10.4	Variable

Histological Subtype	Frequency (n)	Percentage (%)	Risk Category
Morpheaform	6	5.2	High-risk (aggressive)
Nodular-morpheaform	5	4.3	High-risk (aggressive)
Infiltrative	4	3.5	High-risk (aggressive)
Superficial-nodular-infiltrative	2	1.7	High-risk (aggressive)
Total	115	100.0	

As presented in Table 3, among aggressive histological variants, the nodular-infiltrative pattern was the most prevalent, accounting for 14.8% (n=17) of cases. This mixed subtype demonstrates features of both nodular and infiltrative growth patterns, typically indicating more aggressive biological behavior with potential for deeper tissue invasion and subclinical extension beyond clinically apparent tumor margins. Morpheaform BCC was identified in 5.2% (n=6) of cases, representing a particularly challenging subtype characterized by sclerotic stroma and poorly defined clinical margins. The nodular-morpheaform mixed pattern was present in 4.3% (n=5) of cases, while purely infiltrative BCC accounted for 3.5% (n=4) of the study population. A rare superficial-nodular-infiltrative mixed variant was documented in 1.7% (n=2) of cases. Other mixed histological patterns not falling into standard classification categories represented 10.4% (n=12) of cases, likely reflecting the heterogeneity of BCC morphology and the presence of multiple growth patterns within single tumors. Notably, 18.3% (n=21) of cases lacked specific histopathological subtype documentation in pathology reports, representing a significant limitation in the histological characterization of this subset of patients. This absence of detailed subtype classification may reflect variability in pathology reporting practices, limitations in specimen quality, or differences in pathologist interpretation and documentation standards. When categorized by risk classification, low-risk non-aggressive lesions (primarily nodular subtype) represented 41.7% of cases with documented histology. High-risk aggressive subtypes (nodular-infiltrative, morpheaform, nodular-morpheaform, infiltrative, and superficial-nodular-infiltrative) collectively accounted for 29.5% (n=34) of all cases, indicating that approximately one-third of the study population had histological features associated with increased recurrence risk and more challenging surgical management.

The relatively high proportion of aggressive histological subtypes has important clinical implications. Aggressive variants are associated with irregular growth patterns, poorly defined clinical margins, deeper tissue invasion, and higher rates of incomplete excision with standard surgical techniques. These features necessitate more careful preoperative planning, wider surgical margins, meticulous intraoperative margin assessment, and potentially more extensive reconstructive procedures to achieve complete tumor clearance while optimizing functional and cosmetic outcomes.

The distribution of histological subtypes also reflects the referral pattern and case complexity typical of tertiary hospital settings. The substantial representation of aggressive variants (29.5%) suggests that the hospital-based population captured in this study may include a higher proportion of advanced, complex, or recurrent cases compared to community-based populations, where lower-risk superficial and nodular subtypes often predominate.

DISCUSSION

This study demonstrates that basal cell carcinoma (BCC) predominantly affects elderly individuals, particularly those aged over 60 years, which is consistent with previous epidemiological studies indicating that cumulative ultraviolet exposure and age-related biological decline are major contributing factors in tumor development (6,16,17). The concentration of cases in older age groups supports earlier findings that BCC is primarily a disease associated with long-term environmental exposure and aging processes. The slight predominance among female patients in this study differs from some Western reports that show higher incidence in males, but similar patterns have been observed in several Asian populations, possibly reflecting differences in healthcare-seeking behavior and sociocultural factors (14).

The predominance of cases managed in surgical oncology and plastic surgery units suggests that many patients presented with lesions requiring operative management, which may indicate delayed diagnosis or advanced tumor progression. Previous hospital-based studies have similarly reported that tertiary care centers tend to receive more complex cases involving facial structures that require reconstructive procedures (5,10,18). The anatomical distribution of lesions in this study, mainly located in the nasal and periorbital regions, is also consistent with earlier research showing that most BCC lesions develop in sun-exposed areas of the head and neck due to chronic ultraviolet radiation exposure.

The finding that farmers constituted the largest occupational group further supports the established relationship between prolonged sun exposure and increased risk of skin cancer. This aligns with previous epidemiological evidence linking outdoor occupations with higher incidence of non-melanoma skin cancers (14). Histomorphological results revealed that the nodular subtype was the most common variant, consistent with global studies identifying nodular BCC as the predominant form. However, the presence of aggressive subtypes such as

nodular-infiltrative and morpheaform patterns highlights the clinical importance of histopathological examination, as these variants are associated with deeper invasion and higher recurrence risk (1).
The association between lower educational level and higher case distribution may suggest limited awareness of early symptoms and delayed healthcare utilization, a pattern also described in previous regional studies (16). Despite providing valuable clinical insights, this study has several limitations, including its retrospective design and reliance on hospital-based data, which may not fully represent the broader community population. Future multicenter and prospective studies are needed to better understand risk factors, early detection patterns, and long-term clinical outcomes. Overall, the findings reinforce previously established epidemiological patterns while contributing important regional data on the demographic and histopathological characteristics of BCC in Indonesia.

CONCLUSION

This retrospective study of 115 basal cell carcinoma cases at Dr. Moewardi General Hospital from 2021–2023 demonstrates that BCC in Central Java predominantly affects elderly individuals (mean age 64.3 years), with slight female predominance (55.7%). The disease shows strong association with occupational sun exposure, particularly among farmers (25.2%), and concentration in facial aesthetic units, especially the nasal region (33.0%). Histopathologically, while nodular subtype remains most common (56.5%), the substantial proportion of aggressive variants (39.1%) necessitates careful histological evaluation for treatment planning. The progressive increase in annual cases (30→40→45) and predominance of complex cases requiring surgical management underscore the need for enhanced early detection programs and public awareness campaigns, particularly targeting high-risk groups with outdoor occupations and limited educational backgrounds. These findings provide important baseline epidemiological data for BCC in Indonesia and highlight the continuing burden of this malignancy in tertiary healthcare settings. Future prospective multicenter studies with longer follow-up periods are warranted to establish comprehensive incidence data, evaluate treatment outcomes, and assess recurrence patterns in the Indonesian population.

Ethics Approval

This study was approved by the Health Research Ethics Committee of Dr. Moewardi General Hospital, Surakarta, Indonesia (clearance number: 013/I/HREC/2026). The study was conducted in accordance with the Declaration of Helsinki and all applicable local regulatory requirements. As this was a retrospective study using anonymized patient data from medical records, individual informed consent was waived by the ethics committee.

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