RESEARCH PAPER

Clinicopathological Presentation of Basal Cell Carcinoma Over 5-Years: A Single Center Experience

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ABSTRACT

Background and Objectives: Basal cell carcinoma is the most common skin malignancy and is strongly linked to chronic ultraviolet exposure. This study evaluated the clinicopathological characteristics, risk factors, histopathological subtypes, treatment patterns, and outcomes of basal cell carcinoma over 5 years in Sulaimaniyah City, Iraq.

Methods: A retrospective cohort review of archived records from Sulaimani Hospital for Burn and Reconstructive Surgeries and Shorsh Teaching Hospital was conducted for incident, histopathology-confirmed basal cell carcinoma diagnosed from January 1, 2020 to December 31, 2024.

Results: The mean age of patients was 64.76 ± 13.42 years; 176 (58.7%) patients were male and 124 (41.3%) were female. The face was the most common lesion site, observed in 256 cases (85.3%), followed by the scalp in 15 (5.0%) and other sites in 22 (7.3%). Nodular appearance was the predominant clinical pattern in 205 (68.3%) patients, and nodular histopathological subtype was the most frequent subtype in 169 (56.3%) cases. Solar elastosis and actinic keratosis were present in 165 (55.0%) patients, perineural invasion in 20 (6.7%), and history of chronic disease in 80 (26.7%). All patients underwent surgical excision; complete excision was achieved in 273 (91.0%) cases, whereas 27 (9.0%) had incomplete excision. Recurrence occurred in 30 (10.0%) patients, and 298 (99.3%) patients were alive at the end of follow-up.

Conclusion: Basal cell carcinoma in this cohort was most commonly seen on the face and frequently showed nodular clinical and histopathological patterns. Surgical excision was generally effective, with a high rate of complete removal and a relatively low recurrence rate.

Keywords: Carcinoma, Basal Cell; Skin Neoplasms; Ultraviolet Rays; Neoplasm Recurrence

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INTRODUCTION

Basal cell carcinoma is the most common form of skin cancer, characterized by slow growth, local invasion, and rare metastatic potential. Because it originates from the basal layer of the epidermis, it is classified as a cutaneous neoplasm.[1] Approximately 80% of all keratinocyte malignancies are Basal cell carcinoma the most common skin cancer.[2] The etiology of BCC is thought to be multifactorial, involving complex interactions between ultraviolet (UV) radiation, genetic factors (phenotype and genotype), and other personal characteristics. Although Basal cell carcinoma has a low mortality rate, its incidence continues to rise, particularly in Caucasians populations; thus, UV exposure remains the most significant risk factor for developing Basal cell carcinoma. Other factors that may play a role include fair skin phototype, increased age, male sex, immunosuppression, and occupational sun exposure.[3]

Clinical types of Basal cell carcinoma include nodular, cystic, superficial, pigmented, morphoeaform (sclerosing), keratotic, and fibroepithelioma of Pinkus. Most lesions appear on the head and neck.[4] Histopathological subtypes according to WHO classification stratified by recurrence risk include lower-risk subtypes (nodular, superficial, pigmented and infundibulocystic) and higher-risk subtypes (basosquamous carcinoma, sclerosing/morpheic, infiltrating and micronodular Basal cell carcinoma).[5] The infiltrative and morpheaform subtypes are significantly associated with higher recurrence rates and require greater surgical margins than the nodular and superficial variants.[6] Compared to nonsurgical interventions, surgical excision consistently demonstrates improved long-term effectiveness and decreased rates of recurrence.[7] In a study from Baghdad, Iraq, Al-Zoubaidi reported that among 39 patients with Basal cell carcinoma (82% male, 18% female; mean age 64.1 ± 12.7 years), pigmentonodular BCC (53.2%) and pigmented Basal cell carcinoma (27.4%) were the most common subtypes, with 88% of lesions located on the head, particularly the face (72.6%) and scalp (16.1%).[8]

Prior studies from the region have provided foundational insights into Basal cell carcinoma demographics and behavior. El-Khalawany et al. conducted a 5-year retrospective multicenter study on the Egyptian population and registered 544 patients whose age ranged between 22 and 91 years with a mean of 61.6 ± 13.2 years, with females showing a younger age of onset.[2] Similarly, Saeidi et al., retrospectively evaluated facial BCC at a single center and found that 60.5% were male, 4.8% had tumor recurrence with no regional metastasis, and the nose and temporal region were the most commonly affected sites.[9] Furthermore, Mama examined BCC recurrence in Erbil city, Iraq, and found that among 60 patients (50% male, 50% female), 56.7% resided in rural areas and 70% were illiterate; the study also reported that recurrent BCCs were all surgically excised with margins less than 4 mm, suggesting that surgical margins exceeding 4 mm may help reduce recurrence rates.[10]

While previously published reports have added to the current knowledge on the topic of Basal cell carcinoma, there is a lack of population-based data on bcc in the Iraqi Kurdistan region (including Sulaimaniyah City) that hinders the ability to describe local epidemiological patterns, histopathological characteristics and treatment outcomes in an area with a high level of UV exposure. Therefore, this study aimed to evaluate the clinicopathological characteristics, risk factors, histopathological subtypes, treatment patterns, and outcomes of Basal cell carcinoma over a 5-year period in Sulaimaniyah City, Iraq.

2. Methods and Materials

2.1 Study design and setting

This retrospective cohort study was based on reviewing the archived medical records of Sulaimani Hospital for Burn and Reconstructive Surgeries and Shorsh Teaching Hospital. Data abstraction was performed between January and July 2025; however, records were reviewed for incident Basal cell carcinoma diagnoses over a five-year period by date of diagnosis (January 1, 2020 through December 31, 2024).

2.2 Participants

The source population included all patients of any age and sex diagnosed with Basal cell carcinoma in the participating hospitals over 5 years. A consecutive sampling strategy was applied. We obtained approximately 500 Basal cell carcinoma cases from hospital registries and pathology archives, of which 300 patients had sufficiently complete records (including key baseline variables and follow-up status) and were thus included in the final analytic cohort (N = 300).

Inclusion criteria: Patients diagnosed with histopathologically confirmed Basal cell carcinoma at either of the participating hospitals during the 5-year study period (January 1, 2020–December 31, 2024), regardless of age or sex. Exclusion criteria: Patients with non- Basal cell carcinoma skin malignancies (eg, SCC or melanoma) and records with missing critical clinicopathologic or outcome data (eg, lack of histology and/or follow-up data needed to determine recurrence/survival).

2.3 Data collection

Data were retrospectively extracted. Basal cell carcinoma cases were identified from hospital registries and pathology logbooks, and then verified through pathology report review (date of diagnosis and site of lesion). A structured data extraction tool was utilized to extract data systematically for demographic variables (e.g. age at diagnosis, sex, area of residence, type of occupation, and recorded skin type), and clinical characteristics of the Basal cell carcinoma lesions (e.g. site of lesion, number of lesions, duration prior to diagnosis, pattern of clinical presentation of lesion, symptoms related to the lesion, and maximum clinical diameter of the lesion as measured from the original record).

From the finalized pathology reports, extracted data that included both histopathological findings (subtype, depth of invasion when reported, margin status, perineural invasion, and other findings mentioned such as solar elastosis (SE) and actinic keratosis (AK)) and treatment information (Surgical excision and whether or not they had complete negative margins or incomplete positive margins using the histological results). Outcome information included follow-up duration (calculated from definitive excision to last documented visit), tumor recurrence, survival status, or cause of death whenever possible; recurrence was defined by the physician documentation or histopathological confirmation of the same or adjacent lesion followed by evidence of new lesions in distant sites being classified as primary tumors. Based on each patient's documented occupation, their UV exposure risk was classified into high, medium, or low based on their recorded job, and any immunosuppressed or comorbid conditions were recorded if explicitly mentioned within the records.

2.4. Pathological Staging

Pathological Staging Pathological staging of basal cell carcinoma was performed according to the American Joint Committee on Cancer (AJCC) 8th Edition criteria for primary tumor (pT). Due to the retrospective nature of the study and limitations in available histopathological reports, complete high-risk feature assessment for precise pT staging was not feasible in all cases. Therefore, staging was primarily based on available tumor size and documented features such as perineural invasion and depth of invasion.

2.5. Statistical analysis

Data were coded, entered, and analyzed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables (e.g., age, lesion size, and depth of invasion) were summarized as mean ± standard deviation (SD), while categorical variables (e.g., sex, residence, lesion site, clinical and histopathological subtypes, excision status, recurrence, and survival) were presented as frequencies and percentages.

2.6. Ethical considerations

The protocol was approved by the local Research Scientific & Ethics Committee (Meeting Code: 1916; July 22, 2025). Given the retrospective design and use of existing records, informed consent was waived. Data access occurred only after official institutional permission, and confidentiality safeguards were applied throughout extraction and analysis.

3. Results

A total of 300 patients with Basal cell carcinoma were included in the study. The mean age of the patients was 64.76 ± 13.42 years. Male patients constituted 176 (58.7%) of the cohort, whereas females represented 124 (41.3%). Regarding residence, 167 (55.7%) of the patients were from rural areas and 133 (44.3%) were from urban areas. In terms of skin type, fair skin was the most common phenotype, accounting for 151 (50.3%) of cases, followed by medium skin type in 113 (37.7%) and dark skin type in 36 (12%) of patients (Table 1).

Table (1): Demographic and Skin Phenotype Characteristics of Patients with BCC.

Demographic Data		No.	%
Age		64.76 ± 13.417	
Sex	Male	176	58.7%
	Female	124	41.3%
Residence	Urban	133	44.3%
	Rural	167	55.7%
Skin type	Fair	151	50.3%
	Medium	113	37.7%
	Dark	36	12%

Most BCC lesions were located on the face 256 (85.3%) and were single lesions 287 (95.7%). The most frequent duration before diagnosis was 6–12 months, 141 (47%). Most patients were asymptomatic at presentation 233 (77.7%). The mean lesion size was 1.431 ± 0.811, and the mean depth of invasion was 0.301 ± 0.424 (Table 2).

Table (2): Clinical Characteristics and Presentation Patterns of BCC Lesions.

Clinical Presentation		No.	%
Site of lesion	Face	256	85.3%
	Neck	2	0.7%
	Scalp	15	5%
	Trunk	2	0.7%
	limbs	3	1%
	Other	22	7.3%
Number of lesions	Single	287	95.7%
	Multiple	13	4.3%
Duration of lesion before diagnosis	< 6 months	19	6.3%
	6-12 month	141	47%
	> 1 year	140	46.7%
clinical presentation(symptoms)	Asymptomatic	233	77.7%
	Recurrent crusting/scabbing	31	
	Spontaneous oozing /bleeding	14	4.7%
	Pruritus	10	3.3%
	Pain/tenderness	4	1.4%
	Recurrent crusting, bleeding	2	0.7%
	Recurrent scabbing, pruritus	3	1%
	Pain, itching, bleeding	1	0.3%
	Bleeding I, pruritus	2	0.7%
Size of lesion		1.431± 0.811	
Depth of invasion		0.301 ± 0.424	

Nodular BCC was the predominant histopathological subtype, accounting for 169 (56.3%) of cases. Other subtypes included infiltrative Basal cell carcinoma in 40 (13.3%), superficial Basal cell carcinoma in 16 (5.3%), pigmented Basal cell carcinoma in 9 (3%), and morphea form subtype in 2 (0.7%). Mixed histopathological patterns were infrequent, including infiltrative-nodular in 2 (0.7%), nodular-infiltrative in 1 (0.3%), nodular-superficial in 2 (0.7%), and nodular-nodular patterns in 2 (0.7%). Other histopathological variants accounted for 57 (19%) of cases. SE and AK were identified in 165 (55%) of patients, while 135 (45%) had no associated lesions. Perineural invasion was present in 20 (6.7%) of cases and absent in 280 (93.3%). 80 (26.7%) of the patients had chronic disease, while 220 (73.3%) had no history of chronic disease (Table 3).

Table (3): Histopathological Characteristics and Associated Pathological Features of Basal cell carcinoma.

Histopathological Features		No.	%
Histopathological subtype	Infiltrative	40	13.3%

	Infiltrative, Nodular	2	0.7%
	Morpheaform	2	0.7%
	Nodular	169	56.3%
	Nodular, Infiltrative	1	0.3%
	Nodular, Nodular	2	0.7%
	Nodular, Superficial	2	0.7%
	Pigmented	9	3%
	Superficial	16	5.3%
	Other	57	19%
SE + AK	Yes	165	55%
	No	135	45%
Presence of perineural invasion	Yes	20	6.7%
	No	280	93.3%
Chronic disease	Yes	80	26.7%
	No	220	73.3%

Figure (1) demonstrates the occupational risk classification among patients. High-risk occupations (Farmers, construction workers, drivers, fishermen, military personnel, traffic police, gardeners, street vendors) represented the largest category, accounting for 149 (49.7%) of patients. Medium-risk occupations (Teachers, shopkeepers, delivery workers, engineers with mixed indoor/outdoor work) constituted 87 (29%) of cases, while low-risk occupations (Office workers, clerks, bankers, IT workers, indoor factory workers) accounted for 64 (21.3%) of the study population.

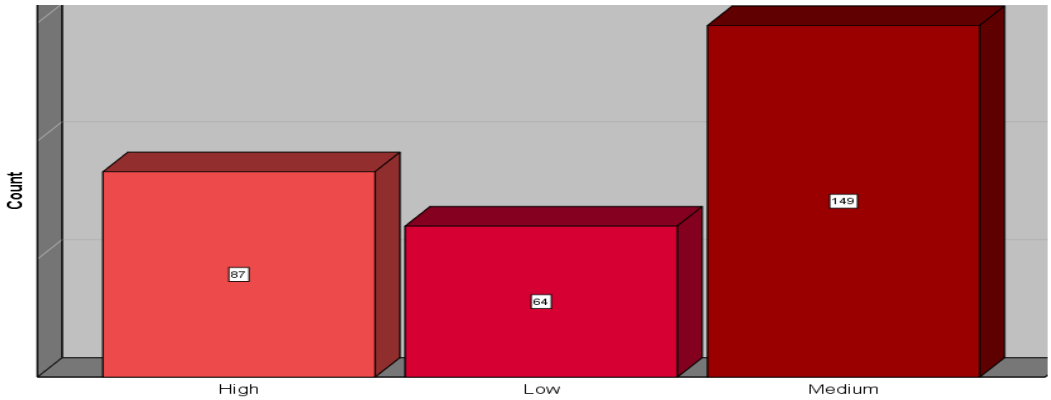

Figure (1): Distribution of Occupational Risk Categories Among Patients with Basal cell carcinoma.

All patients 300 (100) underwent surgical excision as the primary treatment modality. Complete excision was achieved in 273 (91%) of patients, whereas incomplete excision was reported in 27 (9%) (Table 4).

Table (4): Surgical Management and Excision Outcomes in Patients with Basal cell carcinoma.

Treatment and Response		No.	%
Type of treatment received	Surgical excision	300	100%
	Other	-	-
Completeness of excision	Complete	273	91%
	Incomplete	27	9%

The most common follow-up durations were 12 months in 117 (39%) of patients and 24 months in 99 (33%). Follow-up durations of 9 months and 14 months were observed in 34 (11.3%) and 18 (6%) of patients, respectively. Smaller proportions of patients were followed for 36 months 11 (3.7%), 48 months 3 (1), 6 months 8 (2.7%), and other time intervals ranging from 1 to 21 months. No recurrence was documented in 270 (90%) of patients. Recurrence after 12 months was the most frequent recurrence pattern, occurring in 7 (2.3%) of cases, followed by recurrence after 9 months in 6 (2%6) and after 14 months in 5 (1.7%). Recurrences after 10 months, 11 months, 16 months, 17 months, 18 months, 19 months, 24 months, and 36 months were each reported in ≤1% of cases. At the end of follow-up, 298 (99.3%) of patients were alive, whereas 2 (0.7%) had died. Both deaths were attributed to causes other than BCC, specifically renal disease (Table 5).

Table (5): Follow-up Duration, Recurrence Patterns, and Survival Outcomes Among Patients with BCC.

Treatment and Response		No.	%
Follow-up duration (month)	1	1	0.3%
	3	1	0.3%

	5	1	0.3%
	6	8	2.7%
	8	1	0.3%
	9	34	11.3%
	10	2	0.7%
	11	1	0.3%
	12	117	39%
	14	18	6%
	18	2	0.7%
	21	1	0.3%
	24	99	33%
	36	11	3.7%
	48	3	1%
Recurrence	No	270	90%
	Yes (after 9 months)	6	2%
	Yes (after 10 months)	2	0.3%
	Yes (after 11 months)	3	1%
	Yes (after 12 months)	7	2.3%
	Yes (after 14 months)	5	1.7%
	Yes (after 16 months)	1	0.3%
	Yes (after 17 months)	1	0.3%
	Yes (after 18 months)	1	0.3%
	Yes (after 19 months)	1	0.3%
	Yes (after 24 months)	2	0.7%
	Yes (after 36 months)	1	0.3%
Survival status	Alive	298	99.3%
	Deceased	2	0.7%
If deceased, cause	Other (renal disease)	2	0.7%

The majority of cases were classified as PT1 272 (90.7%), followed by PT2 28 (9.3%). (Figure 2).

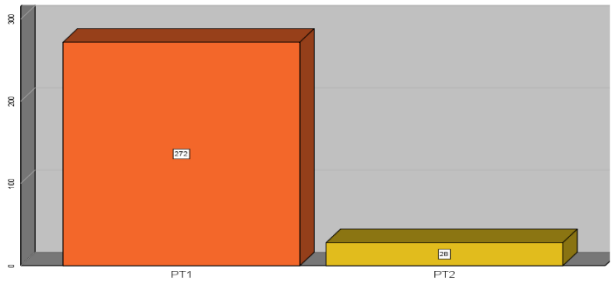

Figure (2): Distribution of Disease Stages in Patients Diagnosed with BCC.
Note: Primary Tumor (pT) Stage Pathological Criteria

4. Discussion

This research aimed at a full assessment of the epidemiological profile, occupational and environmental risk exposures, clinical distribution patterns, histopathological phenotypes, and surgical outcomes of patients with Basal cell carcinoma over a five-year period. Main findings revealed that BCC mostly affects older males, people with light skin phenotypic characteristics, and rural residents who likely have greater cumulative exposure risks due to working outdoors; Tumors were most often located on the head and face and the nodular subtype was the most common type in both clinical appearance and histology. More than half of the patients demonstrated associated solar elastosis and actinic keratosis, indicating substantial cumulative photodamage within the surrounding skin. Solar elastosis serves as a histological marker of chronic UV exposure, whereas actinic keratosis reflects field cancerization resulting from repeated ultraviolet injury. Their frequent coexistence with Basal cell carcino supports the hypothesis that chronic UV exposure remains the dominant environmental driver of cutaneous carcinogenesis in this population. Although standard surgical excision remains the first choice for treatment with good overall survival, there were a number of issues: substantial delays in patient presentation; nine percent positive surgical margins; and an overall recurrence rate of ten percent. In summary, these results illustrate the need to improve regional diagnostic and follow-up procedures.

A cohort of 300 Basal cell carcinoma patients were evaluated in this study; the mean age (64.76 ± 13.42 years) of the cohort indicates that the disease typically manifests in older age cohorts. Similar findings have been reported by Sivrikoz et al.,[11] and Van Coile et al.,[12] showing a higher frequency of Basal cell carcinoma after age 50, with a

predominance of Basal cell carcinoma seen in older male patients. A slight predominance of male patients versus female has also been noted in other studies and is likely due to higher rates of occupational UV exposure for men, particularly among those who work outside.[13] The high percentage of rural patients in the current study supports the premise that chronic UV exposure and the high-risk occupational types of these communities have an important impact on Basal cell carcinoma incidence rates.[14]

The anatomical analysis revealed that the most common site for Basal cell carcinoma was the head and neck region, which confirms the linking between UV light the major environmental cause of Basal cell carcinoma and is in accordance with the majority of the worldwide clinical guidelines.[15] The high number of light complexion patients is consistent with previous findings describing how people have an increased risk of developing Basal cell carcinoma if their skin is sensitive to UV light and they carry a genetic susceptibility to Basal cell carcinoma.[16] These findings underscore the need for educational outreach regarding preventative measures against the sun, use of sunscreens, and regular skin examinations among those considered at risk for developing Basal cell carcinoma. The preponderance of solitary Basal cell carcinomas and their long mean time to diagnosis would indicate that Basal cell carcinoma s tend to grow in a slow and symptomatic manner, which may delay patients' presentation and lead to late diagnoses.[17]

The large delay in diagnosis for the subjects of this study (six months to over one year after being diagnosed) is a significant clinical concern due to asymptomatically presenting early stages of the disease combined with limited public knowledge i.e., cutaneous malignancy. The longer the delay the worse the prognosis and the more complex and invasive the surgical treatment will become.[18] Mean lesion size for this patient group was less than one centimetre, but there were some cases with very advanced local invasion making identification of these tumours even more difficult. From a clinical viewpoint, the high number of nodular lesions in this study is consistent with classical descriptions of Basal cell carcinoma.[19] The high number of asymptomatic patients in the sample reflects the characteristically slow growth and pain free nature of BCC.[20] The presence of numerous types of Basal cell carcinoma (ulcerative, pigmented and mixed) demonstrates that BCC is a heterogeneous disease; therefore, using only the classic morphology to identify patients with Basal cell carcinoma could delay their diagnosis.[21]

The most common histopathological subtype was nodular, consistent with recent reports that nodular Basal cell carcinoma is the most common histologic subtype.[22] In particular, a large proportion of tumors were of more aggressive subtypes, such as infiltrative and morpheaform tumors, which are associated with locally destructive behavior, less well defined surgical margins and a higher risk for recurrence.[23] Perineural invasion was a feature in a subset of patients with clinical relevance as it may be indicative of a more aggressive tumor biology and should be incorporated in treatment planning and surveillance strategies.[24] Furthermore, the high incidence of SE and AK suggests a role of chronic UV damage in the pathogenesis of these tumors.[25]

Evaluation of surgical treatments demonstrated that excisional (resection) surgery, carried out as first-line therapy for every patient, led to an excellent rate of success and a complete histological removal of the tumor; thus, 91% of patients' tumors were pathologically negative for residual tumor or had negative margins. In contrast, positive or incomplete margins were found to occur in 9%, highlighting the clinical benefit of intra-operative pathology margins such as frozen sections and providing the possible indication for the need for wider safety margins in aggressive phenotypes.[26] The overall recurrence of all patients during follow-up was 10% and most occurred within 12 months of surgery. This pattern of recurrence supports the development and use of a formalized and rigorous follow-up protocol for no less than 2 years after the excision of the tumor, especially for patients diagnosed with higher stage malignancies or having incomplete excision margins.[27] The overall median survival time of the cohort was extremely high, and all deaths were not attributed to Basal cell carcinoma; therefore, excisional (resected) surgery gives an outstanding prognosis for this cancer if treated appropriately.[28]

With respect to tumor stage, the predominance of pT1 in most patients suggests that many lesions were diagnosed at an early stage, which may reflect reasonable access to health care services in the study setting.[29] However, the occurrence of incomplete resections and more aggressive histologic subtypes indicates that further improvement in early detection and more precise surgical techniques remains necessary.[30]

Change to this This study provides valuable regional data on the clinicopathological characteristics and treatment outcomes of basal cell carcinoma over a five-year period. Its strengths include a relatively large sample size, histopathologically confirmed diagnoses, and comprehensive evaluation of clinical, pathological, and outcome variables.

However, the study has several limitations. Its retrospective design may be subject to incomplete documentation and information bias. As a single-center study, the findings may not be generalizable to other populations. Additionally, the lack of detailed data on cumulative UV exposure and other potential risk factors, together with the absence of multivariable analysis, limited the assessment of independent predictors of disease outcomes. Future prospective multicenter studies are recommended to validate these findings.

5. Conclusions

In the population studied, Basal cell carcinoma was mainly diagnosed in older adults, males, rural residents and individuals with fair skin and the face was the most frequent site of involvement. The nodular pattern was the most common subtype, both clinically and histopathologically, and surgical excision achieved complete removal of the lesion in most cases. In conclusion, the results highlight the important role of chronic sun exposure, the importance of early detection of suspicious cutaneous lesions and the need

for careful post treatment monitoring, especially in aggressive subtypes or in immunosuppressed patients. Our results may provide guidance for regional efforts to improve Basal cell carcinoma diagnosis, prevention and treatment planning.

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Data availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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