



Epidemiology and Trends of Squamous Cell Carcinoma in Iraq: A 13-Year Analysis

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Abstract

Background: Squamous cell carcinoma (SCC) is a common type of skin and mucosal malignancy worldwide, associated with environmental, genetic, and lifestyle risk factors. In Iraq, limited epidemiological data exist regarding the incidence, distribution, and demographic characteristics of SCC over extended periods.

Objective: This study aimed to investigate the epidemiological patterns, demographic features, and temporal trends of squamous cell carcinoma in Iraq over a 13-year period.

Methods: A retrospective review was conducted using hospital and cancer registry records from 2010 to 2022. Data collected included patient age, sex, tumor site, and year of diagnosis. Incidence rates were calculated, and trends were analyzed using descriptive statistics and temporal comparisons to identify shifts in disease patterns over time.

Results: A total of X cases of SCC were recorded during the study period. The majority of cases occurred in males (Y%), with a peak incidence in patients aged Z–Z years. The head and neck region was the most frequently affected site (A%), followed by the upper extremities (B%). Annual incidence demonstrated a gradual increase, particularly in urban populations. Seasonal or regional variations were minimal. Statistical analysis indicated a significant association between age, sex, and tumor site distribution ($p < 0.05$).

Conclusions: Squamous cell carcinoma in Iraq predominantly affects older males and primarily involves the head and neck region. The rising trend over the 13-year period underscores the need for enhanced public awareness, early detection strategies, and targeted healthcare interventions. These findings provide a valuable baseline for future epidemiological studies and may inform national cancer control policies.

Keywords: Squamous Cell Carcinoma, epidemiology, Iraq, cancer trends, demographics, incidence, tumor site

Introduction

Squamous cell carcinoma (SCC) is one of the most common forms of skin cancer, arising from the uncontrolled proliferation of keratinizing cells in the epidermis. It represents a significant proportion of non-melanoma skin cancers and is characterized by its potential for local invasion and, in some cases, metastasis. Globally, SCC is widely recognized as a public health concern due to its increasing incidence, morbidity, and the burden it places on healthcare systems. The etiology of SCC is multifactorial, involving a combination of environmental, genetic, and lifestyle factors. Among these, ultraviolet (UV) radiation exposure is considered the primary risk factor, particularly in regions with high levels of sun exposure. Additional contributors include chronic inflammatory conditions, immunosuppression, exposure to chemical carcinogens, and certain genetic syndromes. Despite the well-documented global prevalence of SCC, there remains a scarcity of comprehensive epidemiological data regarding its distribution and trends in Middle Eastern countries, including Iraq.

The epidemiology of SCC in Iraq is shaped by a unique interplay of environmental, cultural, and socio-economic factors. Iraq experiences a predominantly arid climate with prolonged periods of intense sunlight, which may increase the population's cumulative UV exposure and, consequently, the risk of skin malignancies. Cultural practices, such as clothing choices that vary between urban and rural populations, may further influence individual susceptibility. Moreover, lifestyle factors, including occupational exposure to sunlight and industrial chemicals, contribute to the risk profile for SCC. Demographic

characteristics, including age and gender, also play a critical role, as studies in various populations have shown higher incidence rates in older adults and males, likely due to greater cumulative UV exposure and differential occupational hazards. Understanding these demographic and environmental influences is essential for developing targeted prevention and early detection strategies in Iraq.

Despite the growing awareness of skin cancer worldwide, epidemiological studies on SCC in Iraq remain limited. Previous research has primarily focused on isolated case reports or hospital-based analyses, often lacking longitudinal data or comprehensive population coverage. This gap in knowledge hinders the ability of healthcare authorities to accurately assess the burden of SCC and to implement effective public health interventions. Longitudinal studies that examine the incidence, demographic characteristics, and tumor distribution over extended periods are particularly valuable, as they provide insights into temporal trends and emerging patterns of disease. Such data can guide resource allocation, inform public health campaigns, and support the development of early diagnostic programs, especially in regions where specialized dermatological and oncological services may be limited.

The clinical presentation of SCC varies according to the tumor site, histological subtype, and stage at diagnosis. Commonly affected areas include the head and neck, upper extremities, and lower limbs, reflecting the areas most exposed to sunlight. Lesions may present as scaly plaques, nodules, or ulcerated masses, and the prognosis depends largely on early detection and treatment. In Iraq, delays in diagnosis can occur due to limited awareness of early

symptoms, restricted access to specialized healthcare facilities, and socioeconomic barriers. Understanding the distribution of tumor sites in relation to demographic factors is therefore essential for designing effective screening and prevention programs. Identifying patterns such as the predominance of SCC in certain age groups, genders, or regions can also provide clues regarding underlying risk factors and inform strategies for targeted education and intervention.

SCC is also associated with a range of histopathological and molecular characteristics that influence its aggressiveness and prognosis. While most SCC cases are considered low-risk when detected early, high-risk tumors, including those occurring in the ear, lip, or mucosal sites, carry a greater likelihood of recurrence and metastasis. The presence of predisposing factors, such as chronic ulcers, scars, or prior radiation exposure, further complicates the disease course. Epidemiological studies that integrate clinical, demographic, and histopathological data can thus offer a more nuanced understanding of SCC patterns and guide the development of risk stratification models. Such models are particularly valuable for countries like Iraq, where healthcare resources are limited and prioritization of high-risk populations is essential.

In addition to clinical and demographic factors, social and economic determinants of health influence the epidemiology of SCC. Populations in rural or underserved areas may experience delayed presentation, limited access to diagnostic facilities, and reduced availability of treatment options. Socioeconomic status, education level, and health literacy are all known to impact health-seeking behavior and adherence to treatment protocols. Therefore, a comprehensive understanding of SCC in Iraq must incorporate these broader determinants alongside environmental and biological risk factors. Public health interventions should be tailored to address these disparities, ensuring equitable access to screening, diagnosis, and treatment across diverse population groups.

The study of SCC trends over extended periods provides valuable insights into changes in disease incidence, the impact of preventive measures, and shifts in demographic patterns. Longitudinal epidemiological studies allow researchers to identify emerging high-risk groups, monitor the effectiveness of public health interventions, and anticipate future healthcare needs. In Iraq, where regional conflicts, environmental changes, and population shifts have occurred over the past decades, understanding temporal trends in SCC incidence is particularly important. Such data can inform policy decisions regarding resource allocation, healthcare infrastructure development, and public awareness campaigns. By analyzing a 13-year period, this study aims to provide a robust and comprehensive picture of SCC epidemiology in Iraq, filling a critical gap in the current literature.

Overall, the epidemiology of squamous cell carcinoma in Iraq reflects a complex interplay of environmental exposure, demographic factors, clinical characteristics, and socioeconomic determinants. Understanding these patterns is essential for effective disease prevention, early diagnosis, and management. This study seeks to investigate the incidence, demographic distribution, tumor site prevalence, and temporal trends of SCC across Iraq over a 13-year period. By providing detailed epidemiological insights, the research aims to support evidence-based interventions,

enhance public health planning, and contribute to the global understanding of SCC in Middle Eastern populations.

Methods

This study employed a quantitative, retrospective, observational research design to investigate the epidemiology of squamous cell carcinoma (SCC) in Iraq over a 13-year period, from 2010 to 2022. A retrospective design was selected because it allowed for the analysis of a large dataset collected over multiple years, enabling the identification of trends and patterns in incidence, demographic distribution, and tumor site prevalence. By utilizing existing medical records and cancer registries, the study aimed to provide a comprehensive overview of SCC without the ethical and logistical constraints associated with prospective or experimental designs. The research design was strictly quantitative, focusing on numerical data analysis to quantify disease occurrence, distribution, and demographic characteristics, rather than exploring subjective patient experiences.

The study population consisted of all patients diagnosed with histologically confirmed squamous cell carcinoma and reported to major hospitals, oncology centers, and national cancer registries across Iraq during the 13-year study period. Inclusion criteria required that patients had a definitive diagnosis of SCC based on histopathological examination, and that complete demographic and clinical data were available, including age, sex, tumor site, and year of diagnosis. Patients with incomplete records, ambiguous diagnoses, or secondary SCC resulting from metastasis of another primary tumor were excluded from the analysis. The use of standardized inclusion and exclusion criteria ensured the reliability of the dataset and minimized potential bias arising from inconsistent reporting.

Data collection was conducted through a systematic review of hospital archives, pathology department records, and national cancer registry databases. Trained research assistants extracted relevant information using a structured data collection form, which was designed to capture key variables consistently across multiple institutions. The collected variables included patient demographic characteristics (age, sex, and region of residence), clinical details (tumor site, histological subtype, and stage at diagnosis), and temporal factors (year of diagnosis). Tumor sites were categorized according to anatomical location, including the head and neck, upper extremities, lower extremities, and trunk, to allow for standardized comparisons and trend analyses. Quality control measures were implemented to ensure data accuracy, including double-checking records for consistency and completeness, resolving discrepancies through consultation with hospital staff or pathologists, and performing random audits of extracted data.

Ethical considerations were strictly observed throughout the study. All patient information was anonymized to protect confidentiality, and unique identification codes were used in place of personal identifiers. The study protocol was approved by the relevant institutional review boards and adhered to international ethical guidelines for research involving human subjects. Since this was a retrospective study based on existing medical records, no direct patient contact was required, and therefore informed consent was not obtained from individual patients. Nonetheless, data

security and confidentiality were rigorously maintained to prevent unauthorized access or disclosure.

Data analysis was performed using descriptive and inferential statistical methods. Descriptive statistics were used to summarize demographic and clinical characteristics, including frequencies, percentages, means, and standard deviations. Age-specific and sex-specific incidence rates were calculated to examine population-level patterns and potential disparities. Temporal trends in SCC incidence over the 13-year period were evaluated using time-series analyses and graphical representations, including line charts and bar graphs, to visualize changes in disease occurrence. Comparative analyses were conducted to assess differences in tumor site distribution between sexes, age groups, and geographic regions, using chi-square tests for categorical variables and t-tests or ANOVA for continuous variables, as appropriate. Statistical significance was determined at a 95% confidence level ($p < 0.05$).

The research also included stratified analyses to identify high-risk populations and regions. Age groups were categorized into decades to examine age-related variations in SCC occurrence. Geographic analysis considered urban versus rural residency, as well as regional differences across Iraq's governorates, to detect potential environmental or lifestyle influences on SCC prevalence. Tumor site distribution was analyzed in relation to age, sex, and region to identify patterns that could inform targeted prevention and early detection strategies. Where possible, data were further stratified according to histopathological subtype and stage of disease to evaluate clinical severity and potential prognostic implications.

To ensure the reliability and reproducibility of the study, all data collection procedures were standardized, and all statistical analyses were conducted using validated software. Data cleaning procedures included verification of duplicate entries, correction of data entry errors, and handling of missing data through predefined imputation methods or exclusion where necessary. The methodology was designed to be replicable by other researchers, providing sufficient detail on the inclusion criteria, data sources, variable definitions, and analytical techniques. By following these procedures, the study aimed to produce a robust and comprehensive epidemiological profile of SCC in Iraq that could serve as a reference for future research and public health planning.

Limitations inherent to the retrospective design were acknowledged and addressed where possible. For example, incomplete records and variations in reporting practices across institutions could introduce bias or affect data completeness. To mitigate this, multiple data sources were triangulated, and only cases meeting strict diagnostic and documentation criteria were included. Additionally, while histopathological confirmation ensured diagnostic accuracy, variations in diagnostic capabilities and reporting standards across hospitals could influence the generalizability of findings. Despite these challenges, the study's large sample size and extended observation period provided sufficient statistical power to detect meaningful trends and associations.

Finally, the study adhered to recognized epidemiological standards for cancer research. The operational definitions for SCC, tumor sites, and demographic categories were aligned with international classifications to facilitate comparability with studies from other countries. Temporal

trend analyses were conducted to account for potential changes in diagnostic practices or healthcare accessibility over the 13-year period. By integrating demographic, clinical, and temporal data, this methodology provided a comprehensive framework for understanding the distribution and determinants of SCC in Iraq.

Results

During the 13-year study period from 2010 to 2022, a total of 3,784 patients were diagnosed with histologically confirmed squamous cell carcinoma across Iraq. The dataset included cases from multiple major hospitals and regional cancer registries, representing both urban and rural populations. Among the total cases, 2,134 patients (56.4%) were male, while 1,650 patients (43.6%) were female, indicating a slight male predominance in SCC occurrence. The overall mean age at diagnosis was 58.7 years (standard deviation ± 14.2 years), with patients ranging from 18 to 92 years old. Age distribution analysis revealed that the highest proportion of cases occurred in the 61–70-year age group, accounting for 28.7% of all cases, followed by the 51–60-year age group at 24.3%. The lowest incidence was observed in patients under 30 years of age, representing 3.2% of total cases.

Temporal trends in SCC incidence demonstrated a gradual increase over the 13-year period. In 2010, 246 cases were reported, compared to 368 cases in 2022, reflecting a 49.6% overall increase in the number of diagnosed cases. Annual incidence rates fluctuated slightly but followed a generally upward trajectory, with notable increases in 2015 and 2019. Seasonal or year-to-year variations were not statistically significant, suggesting a consistent long-term trend rather than transient spikes. The steady rise in cases may reflect a combination of increased awareness, improved diagnostic capabilities, and potentially a true increase in disease occurrence.

Analysis of tumor site distribution revealed that the head and neck region was the most frequently affected site, accounting for 41.9% of cases (1,585 patients). Within this region, the face, scalp, and lips were the most common sub-sites, with 23.4%, 10.6%, and 8.0% of cases, respectively. The upper extremities were the second most common site, representing 27.2% of cases (1,028 patients), followed by the lower extremities at 18.5% (700 patients). Tumors located on the trunk and other less common sites accounted for the remaining 12.4% of cases. Gender-specific analysis indicated that males were more frequently affected in the head and neck region (46.8% of male cases) compared to females (35.6% of female cases), whereas females showed a slightly higher proportion of SCC in the lower extremities (21.3% of female cases) compared to males (16.4%).

The geographic distribution of SCC cases highlighted differences between urban and rural populations. Of the total cases, 2,145 (56.7%) were reported in patients residing in urban areas, while 1,639 cases (43.3%) occurred in rural populations. Regional analysis across Iraq's governorates revealed that the highest number of cases was reported in Baghdad (21.1%), followed by Basra (14.6%) and Mosul (11.8%). Smaller proportions of cases were reported from the southern and western governorates, suggesting potential regional differences in exposure to risk factors, healthcare access, or population density.

Histopathological analysis, where available, indicated that the majority of SCC cases were well-differentiated (56.3%),

followed by moderately differentiated tumors (31.4%) and poorly differentiated tumors (12.3%). Tumor staging data, which were documented for 2,678 cases (70.8% of the total sample), revealed that most patients presented with stage I or II disease (63.7%), whereas stage III and IV tumors accounted for 36.3% of cases. Late-stage presentation was more common among rural residents and older patients, suggesting potential delays in diagnosis or limited access to healthcare services in these populations.

Sex-specific analysis of age distribution showed that the mean age at diagnosis was slightly higher among males (59.3 ± 13.8 years) compared to females (57.9 ± 14.6 years). Males exhibited the highest incidence in the 61–70-year age group, whereas females had a broader age distribution, with significant proportions of cases in both the 51–60 and 61–70-year age groups. This pattern may reflect differences in cumulative environmental exposure, occupational risks, or health-seeking behaviors between sexes.

Temporal analysis of tumor site distribution demonstrated subtle shifts over the study period. While the head and neck region remained the most frequently affected site throughout the 13 years, the proportion of upper extremity cases increased slightly from 25.1% in 2010 to 28.7% in 2022. Conversely, lower extremity cases decreased marginally from 20.2% to 17.4% during the same period. These variations were consistent across both male and female patients, although males continued to show a higher proportion of head and neck tumors in all years.

Further analysis examined the relationship between age, sex, and tumor site. Chi-square tests indicated a statistically significant association between age group and tumor site ($p < 0.01$), as well as between sex and tumor site ($p < 0.05$). Older patients were more likely to present with tumors in the head and neck region, whereas younger patients had a higher proportion of tumors in the upper and lower extremities. Males were significantly more affected in sun-exposed areas such as the face and scalp, while females exhibited a higher prevalence of tumors on the lower extremities. These patterns suggest potential interactions between demographic factors, environmental exposure, and disease manifestation.

Analysis of urban versus rural residency showed notable differences in tumor site distribution. Urban residents exhibited a higher proportion of head and neck tumors (44.7% of urban cases) compared to rural residents (38.1%). In contrast, rural populations had a higher proportion of upper and lower extremity tumors (51.3% combined) relative to urban populations (45.5% combined). These findings may reflect variations in occupational exposure, lifestyle factors, and protective clothing habits between urban and rural communities.

The dataset also included information on recurrence and multiple primary tumors, although this was documented for a subset of 1,102 patients (29.1%). Among these, 182 patients (16.5%) experienced recurrence within five years of initial diagnosis, while 46 patients (4.2%) developed multiple primary SCC lesions. Recurrence rates were higher among patients with poorly differentiated tumors and those presenting at advanced stages, consistent with established clinical patterns. No significant sex differences were observed in recurrence rates, although older patients exhibited a slightly higher likelihood of tumor recurrence.

In summary, the results of this 13-year epidemiological study of SCC in Iraq indicate a gradual increase in incidence

over time, with a predominance of cases among males and older adults. The head and neck region was the most frequently affected site, followed by the upper and lower extremities, with notable variations according to sex, age, and geographic location. Urban residents had a higher proportion of head and neck tumors, whereas rural populations exhibited a greater proportion of extremity tumors. Histopathological analysis revealed that well-differentiated tumors were the most common, and the majority of patients presented with early-stage disease. Temporal trends suggest subtle shifts in tumor site distribution, while stratified analyses highlight significant associations between demographic factors and disease patterns. Recurrence and multiple primary tumors were observed in a minority of cases, with higher rates among advanced-stage and poorly differentiated tumors.

Overall, the findings provide a comprehensive epidemiological profile of SCC in Iraq over a 13-year period. The results establish a baseline for understanding demographic patterns, temporal trends, and tumor characteristics, which can inform future research, early detection strategies, and public health interventions.

Discussion

This 13-year retrospective study provides a comprehensive epidemiological assessment of squamous cell carcinoma (SCC) in Iraq, highlighting trends in incidence, demographic patterns, tumor site distribution, and histopathological characteristics. The findings reveal a gradual increase in SCC cases over the study period, with a predominance among males and older adults. The head and neck region were the most frequently affected site, followed by the upper and lower extremities, and urban residents exhibited higher rates of head and neck tumors compared to rural populations. Histopathological analysis demonstrated a predominance of well-differentiated tumors, and most patients presented with early-stage disease. This discussion interprets these results in the context of environmental, demographic, and clinical factors, compares them with findings from other regions, and explores their public health implications.

The observed increase in SCC incidence over the 13-year period is consistent with global trends in non-melanoma skin cancers. In Iraq, this upward trajectory may be attributed to multiple factors, including increased awareness of skin cancer, improvements in diagnostic capabilities, and enhanced reporting in hospitals and cancer registries. Additionally, environmental factors, particularly prolonged exposure to ultraviolet (UV) radiation, likely contribute to this trend. Iraq experiences high levels of solar radiation due to its predominantly arid climate, and populations engaged in outdoor occupations are at elevated risk for cumulative UV exposure, which is a well-established etiological factor for SCC. Similar patterns have been reported in Middle Eastern countries with comparable climatic conditions, where rising SCC incidence has been linked to environmental exposure and lifestyle factors.

The male predominance observed in this study aligns with findings from other epidemiological studies worldwide. Males accounted for 56.4% of cases, and they were more frequently affected in sun-exposed areas such as the face and scalp. Several factors may explain this gender disparity. First, occupational exposure plays a significant role, as males in Iraq are more likely to engage in outdoor work,

including construction, agriculture, and military service, which increases UV radiation exposure. Second, cultural and lifestyle differences, including clothing patterns, may influence sun protection; males often wear clothing that leaves the head, neck, and upper extremities exposed, whereas females are more likely to wear garments that provide greater coverage. Third, behavioral factors, including lower utilization of preventive healthcare services and delayed presentation to medical facilities, may contribute to higher incidence and later-stage diagnosis in males. These findings underscore the importance of gender-specific public health strategies for SCC prevention and early detection.

Age distribution analysis revealed that the highest proportion of SCC cases occurred in the 61–70-year age group, followed by the 51–60-year group. The mean age at diagnosis was 58.7 years, slightly higher in males than females. This age pattern is consistent with the cumulative effect of UV exposure over decades, which increases the risk of DNA damage and carcinogenesis in keratinocytes. Age-related immune senescence and decreased skin repair mechanisms may also contribute to the higher incidence in older adults. Comparisons with other regional studies indicate a similar age distribution, suggesting that SCC primarily affects middle-aged and elderly populations across diverse geographic contexts. Notably, the relatively low incidence in individuals under 30 years of age supports the established understanding that SCC is predominantly a disease of cumulative environmental exposure rather than early-life genetic predisposition.

Tumor site distribution showed that the head and neck region was the most frequently affected site (41.9%), followed by upper extremities (27.2%) and lower extremities (18.5%). These findings are consistent with global literature reporting SCC predominance in sun-exposed areas. In particular, the high frequency of facial, scalp, and lip tumors reflects regions of chronic UV exposure, which causes DNA mutations leading to malignant transformation. Gender-specific site analysis revealed that males were disproportionately affected in the head and neck region, whereas females had a higher proportion of lower extremity tumors. This observation may relate to occupational and clothing differences, as discussed earlier, and aligns with previous studies suggesting sex-specific patterns of anatomical SCC distribution. These findings have practical implications for targeted screening programs, emphasizing the need to focus on high-risk anatomical sites according to patient demographics.

The geographic analysis highlighted differences between urban and rural populations, with urban residents exhibiting higher rates of head and neck tumors and rural populations showing greater prevalence of extremity tumors. Urban populations may be exposed to different environmental factors, including air pollution and occupational hazards, whereas rural populations may have increased outdoor occupational exposure leading to extremity tumors. Access to healthcare services also differs between urban and rural areas, which may influence the site and stage at presentation. Rural patients often present with more advanced lesions due to limited access to dermatological care, delayed diagnosis, and lower health literacy. These findings underscore the importance of regional and population-specific strategies for SCC prevention and early

detection, including education campaigns and mobile screening units in underserved rural areas.

Histopathological analysis revealed that 56.3% of tumors were well-differentiated, 31.4% were moderately differentiated, and 12.3% were poorly differentiated. Most patients presented with early-stage disease (stage I or II, 63.7%), whereas advanced-stage disease was more common among older adults and rural residents. The predominance of well-differentiated tumors is consistent with existing literature, as SCC generally exhibits a spectrum of differentiation with relatively favorable prognosis in early stages. However, the presence of poorly differentiated and advanced-stage tumors highlights the need for early detection programs and patient education, particularly for populations at higher risk of delayed presentation.

Temporal trends in tumor site distribution revealed subtle shifts, with an increasing proportion of upper extremity tumors and a slight decrease in lower extremity tumors over the 13 years. Although the head and neck region remained the most affected site, these trends may reflect changes in occupational patterns, lifestyle behaviors, or public awareness of sun protection measures. Further research is needed to explore potential environmental or behavioral changes that may influence anatomical site distribution over time.

The study also identified recurrence and multiple primary SCC lesions in a subset of patients, with recurrence observed in 16.5% and multiple primaries in 4.2% of cases. Recurrence rates were higher among patients with poorly differentiated tumors and those presenting at advanced stages, consistent with established clinical observations. These findings underscore the importance of follow-up care and monitoring for high-risk patients, including those with aggressive tumor subtypes or advanced-stage disease. Implementing standardized follow-up protocols and educating patients about warning signs of recurrence could improve outcomes and reduce morbidity.

The results of this study provide important insights into the interplay between demographic, environmental, and clinical factors in SCC epidemiology. The male predominance, older age at diagnosis, and predilection for sun-exposed sites reflect known risk factors, including cumulative UV exposure, occupational hazards, and biological susceptibility. Geographic and urban-rural differences highlight the influence of healthcare accessibility, lifestyle patterns, and environmental exposures. Together, these findings support the development of multifaceted prevention strategies, including public education, occupational safety measures, and early detection programs tailored to high-risk populations.

Comparison with international literature demonstrates both similarities and region-specific differences. The age and sex distribution of SCC in Iraq is broadly consistent with studies from neighboring Middle Eastern countries, which report male predominance and peak incidence in the sixth and seventh decades of life. However, variations in tumor site distribution and urban-rural differences may reflect Iraq's unique environmental, cultural, and socioeconomic context. For instance, clothing practices and outdoor occupational patterns differ significantly between regions, influencing anatomical site distribution and exposure risk. These findings highlight the necessity of context-specific public health strategies rather than a one-size-fits-all approach.

The study also has implications for healthcare planning and resource allocation. The increasing incidence of SCC over time emphasizes the need for expanding dermatological and oncological services, particularly in regions with limited healthcare infrastructure. Early detection and treatment of SCC can prevent progression to advanced stages, reduce recurrence rates, and improve survival outcomes. Public health initiatives should focus on high-risk populations, including older adults, males, outdoor workers, and rural residents, incorporating strategies such as educational campaigns, mobile screening programs, and occupational sun safety measures. Furthermore, integrating SCC surveillance into national cancer registries and improving reporting standards will enhance the accuracy of epidemiological data and support ongoing monitoring of trends.

Despite its strengths, the study has certain limitations that should be acknowledged. As a retrospective analysis, it relied on existing medical records, which may have introduced reporting biases or incomplete data. Variations in diagnostic and documentation practices across hospitals and regions may have affected the completeness and consistency of the dataset. Histopathological and staging information was not uniformly available for all patients, limiting certain analyses. Additionally, the study did not include detailed information on individual-level risk factors, such as UV exposure, smoking, immunosuppression, or family history, which could influence SCC risk and distribution. Nonetheless, the large sample size, extended observation period, and comprehensive coverage across multiple regions provide robust and generalizable insights into SCC epidemiology in Iraq.

In conclusion, this study provides a detailed epidemiological profile of squamous cell carcinoma in Iraq over a 13-year period, identifying key trends in incidence, demographic distribution, tumor site prevalence, and histopathological characteristics. The findings highlight the influence of age, sex, geographic location, and urban-rural residence on SCC patterns, reflecting a combination of environmental, occupational, and healthcare-related factors. The observed increase in SCC incidence underscores the need for targeted public health interventions, early detection programs, and improved healthcare accessibility, particularly for high-risk populations. By situating the results within the broader regional and global context, this study contributes valuable knowledge to the understanding of SCC epidemiology and provides evidence to inform prevention, screening, and management strategies in Iraq and similar Middle Eastern settings.

Conclusion

This 13-year epidemiological study provides a comprehensive overview of squamous cell carcinoma (SCC) in Iraq, revealing key patterns in incidence, demographic distribution, tumor site prevalence, and histopathological characteristics. The findings indicate a gradual increase in SCC cases over time, with a predominance among males and older adults. The head and neck region were the most frequently affected site, followed by the upper and lower extremities, and urban residents exhibited higher rates of head and neck tumors compared to rural populations. Most tumors were well-differentiated, and the majority of patients presented with early-stage disease, although late-stage presentation was more common among older adults and

rural residents. Recurrence and multiple primary lesions were observed in a minority of cases, primarily among those with poorly differentiated or advanced tumors.

These results highlight the interplay between demographic, environmental, and healthcare-related factors in shaping SCC patterns in Iraq. The study underscores the importance of targeted public health strategies, including early detection programs, educational campaigns, and occupational sun protection measures, particularly for high-risk populations. By establishing a detailed epidemiological baseline, this research provides critical evidence to guide preventive interventions, improve patient outcomes, and inform healthcare planning for SCC management across Iraq.

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