

Radiodermatitis in older patients with head and neck cancer

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ABSTRACT

Objective: To analyze the incidence of radiodermatitis in older individuals with head and neck cancer undergoing radiotherapy. **Method:** Observational, prospective, quantitative study. The study included patients aged 60 years or older with head and neck cancer who underwent radiotherapy. Patients were monitored daily during radiotherapy sessions. Skin was assessed using the Acute Radiodermatitis Grading scale, and the occurrence of radiodermatitis and associated signs and symptoms in the irradiated area and skin hydration were recorded. **Results:** Thirty-three participants were monitored, who were submitted to an average of 33 radiotherapy sessions. Radiodermatitis occurred in 93.9% of participants, with an average dose of 34.7 Gy of ionizing radiation. Symptoms of heat, burning, itching, dry skin, and pain, present in 68% of participants, were reported most often in the fifth week of radiotherapy. Regarding skin hydration, most participants showed a marked imbalance, characterized by low moisture and oiliness. **Conclusion:** Most patients monitored displayed signs and symptoms of radiodermatitis during radiotherapy sessions. Nurses play a fundamental role in assessing, monitoring the skin, and providing health education on skin care for older patients during radiotherapy, aiming to prevent signs and symptoms of radiodermatitis.

KEYWORDS: Head and neck cancer. Older patients. Skin. Radiodermatitis.

Radiodermatite em pacientes idosos com câncer de cabeça e pescoço

RESUMO

Objetivo: Analisar a incidência de radiodermatite de idosos com câncer de cabeça e pescoço submetidos à radioterapia. **Método:** Estudo observacional, prospectivo e quantitativo. Foram incluídos pacientes com idade igual ou superior a 60 anos, com câncer de cabeça e pescoço que receberam radioterapia. Os pacientes foram acompanhados diariamente durante as sessões de radioterapia. A pele foi avaliada com a escala Graduação da Radiodermatite Aguda, e foram registradas a ocorrência de radiodermatite, os sinais e sintomas associados na região irradiada e a hidratação da pele. **Resultados:** Foram acompanhados 33 participantes, que realizaram, em média, 33 sessões de radioterapia. A radiodermatite ocorreu em 93,9% dos participantes, com dose média de 34,7 Gy de radiação ionizante. Os sintomas de calor, queimação, prurido, pele seca e dor, presentes em 68% dos participantes, foram mais reportados na quinta semana de radioterapia. Quanto à hidratação da pele, a maioria dos participantes apresentou desequilíbrio acentuado, caracterizado por baixa umidade e oleosidade. **Conclusão:** A maioria dos pacientes acompanhados apresentou sinais e sintomas da radiodermatite durante as sessões de radioterapia. O enfermeiro desempenha um papel fundamental na avaliação, no monitoramento da pele e na educação em saúde sobre os cuidados com a pele de pacientes idosos durante a radioterapia, visando à prevenção de sinais e sintomas da radiodermatite.

DESCRIPTORES: Neoplasias de cabeça e pescoço. Idoso. Pele. Radiodermatite.

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Section Editor: Manuela de Mendonça F. Coelho

Received: June 4, 2024 | Accepted: July 9, 2025

How to cite: Meneses AG, Oliveira LA, Ferreira EB, Reis PED, Espírito Santo FH. Radiodermatitis in older patients with head and neck cancer. ESTIMA, Braz. J. Enterostomal Ther., São Paulo, v23, e1587, 2025.

https://doi.org/10.30886/estima.v23.1587_IN

Radiodermatitis en pacientes ancianos con cáncer de cabeza y cuello

RESUMEN

Objetivo: Analizar la incidencia de radiodermatitis en pacientes ancianos con cáncer de cabeza y cuello sometidos a radioterapia. **Método:** Estudio observacional, prospectivo y cuantitativo. Se incluyeron pacientes de 60 años o más, con cáncer de cabeza y cuello sometidos a radioterapia. Los pacientes fueron monitoreados diariamente durante las sesiones de radioterapia. Se evaluó la piel con la escala GRAL y se registró la ocurrencia de radiodermatitis, signos y síntomas asociados en la región irradiada y la hidratación de la piel. **Resultados:** Se siguieron 33 participantes, quienes se sometieron a un promedio de 33 sesiones de radioterapia. La radiodermatitis se produjo en el 93,9% de los participantes, con una dosis media de 34,7 Gy de radiación ionizante. Los síntomas de calor, ardor, prurito, piel seca y dolor, presentes en el 68 % de los participantes, fueron más informados por los participantes en la quinta semana de radioterapia. En cuanto a la hidratación de la piel, la mayoría de los participantes mostraron un marcado desequilibrio cutáneo, caracterizado por baja humedad y oleosidad. **Conclusión:** La mayoría de los pacientes monitoreados presentaron signos y síntomas de radiodermatitis durante las sesiones de radioterapia. El enfermero desempeña un papel fundamental en la evaluación, el monitoreo de la piel y la educación en salud sobre los cuidados cutáneos de los paciente anciano durante la radioterapia, con el objetivo de prevenir los signos y síntomas de la radiodermatitis.

DESCRIPTORES: Neoplasias de cabeza y cuello. Anciano. Piel. Radiodermatitis.

INTRODUCTION

Aging is a process that can increase the risk of developing chronic diseases. With aging, senescent cells accumulate, secreting cytokines, chemokines, and proteases in a process known as the senescence-associated secretory phenotype (SASP). This activity is characterized by a state of chronic inflammation, increasing the risk of degenerative diseases in the elderly, including cancer¹. Furthermore, the incidence of cancer is projected to increase by approximately 75% by 2030 due to risk-associated lifestyle behaviors and the Westernization of economically developing countries¹. Cancer is considered a major public health problem worldwide, and in Brazil, the estimate for the 2023–2025 triennium is 704,000 new cases per year².

The risk of cancer increases with advancing age. In developed countries, approximately 58% of cancer cases are diagnosed in people 65 or older, while in developing countries, this percentage is approximately 40%. Among the older population, the group known as the oldest, that is, individuals 85 and over, is considered the fastest-growing segment of the population in developed countries¹. This fact reinforces the importance of studies exploring this population.

Head and neck cancer (HNC) encompasses neoplasms affecting the upper aerodigestive tract³. It is estimated that approximately 15,000 new cases of oral cavity cancer occur annually in Brazil, making it a more common subtype in the head and neck region². Approximately 75% of patients diagnosed with HNC receive radiotherapy as an initial treatment or as an adjuvant treatment after surgery⁴.

Radiotherapy is a treatment performed using ionizing radiation that causes direct and indirect damage to DNA, resulting in tumor cell death⁵. Ionizing radiation aims to destroy tumor cells, but it causes cellular damage to the tissues of organs surrounding the irradiated area, such as the skin⁶.

The skin of older adults may experience structural changes due to aging, such as reduced vascularization and skin thickness. In the dermis, there is a decrease in the number of active melanocytes, making this skin more susceptible to hyperpigmentation. A decrease in epidermal thickness, water loss, decreased oxygen exchange, and dehydration may also occur⁷. These changes in older adults' skin can hinder its recovery and cell renewal when these patients undergo radiotherapy.

Skin exposure to ionizing radiation can induce an adverse reaction called radiodermatitis. In an observational study of adult patients with HNC, 100% of participants developed this condition during radiotherapy⁸. Its manifestations include

erythema, hyperpigmentation, dry or moist desquamation⁹, which can negatively affect survival and have a direct impact on patients' quality of life¹⁰.

Considering the importance of skin care in patients with HNC, there is still a gap in knowledge regarding the incidence and severity of radiodermatitis in the older population. This study can help understand factors that contribute to the development of prevention and treatment strategies tailored to the older population, combined with a better understanding by nurses who care for these patients.

OBJECTIVES

This study aimed to analyze the incidence of radiodermatitis in older people with HNC undergoing radiotherapy.

METHODS

Study design

Observational, prospective, quantitative study.

Study site and period when conducted

This study was conducted at the Radiotherapy Outpatient Clinic of the High Complex Oncology Care Unit of a university hospital in Brazil's Central-West region. Data collection occurred between May 2019 and April 2021.

Sample selection

This study population consisted of elderly patients with HNC who underwent radiotherapy.

Eligibility criteria were: patients aged 60 years or older, diagnosed with HNC, undergoing radiotherapy, and with intact skin.

Participants underwent radiotherapy using linear accelerators, namely VARIAN® CLINAC CX and SIEMENS® PRIMUS, using the three-dimensional conformal technique (3D-CRT) for planning.

Recruitment and data collection

All older patients with HNC were recruited for the study on the day of their first radiotherapy session. Participants received information about radiotherapy and skin self-care guidelines. Skin care guidelines were provided in a previously developed and validated manual^{11,12}. The recommendations included cleansing the skin with a mild moisturizing soap (Dove®), provided to participants, and minimizing heat and friction in the irradiated area.

Participants were monitored daily during radiotherapy sessions. Radiodermatitis was classified using the Grading of Acute Radiodermatitis (GRAL) scale¹³. Standardized photographs of the affected areas (frontal, right lateral, and left lateral cervical regions) were taken to document the irradiated area. After the radiotherapy sessions, participants were evaluated an average of 15 days after the end of the sessions.

Sociodemographic and clinical data were collected to characterize the sample. The primary outcome of the study was to characterize the sociodemographic profile and analyze the incidence of radiodermatitis in older patients with HNC undergoing radiotherapy. As a secondary outcome, the participants' symptoms and skin hydration were assessed. Symptoms reported by participants were assessed weekly using a GRAL checklist which allows for the assessment of symptoms such as local heat, burning, itching, dry skin, and pain¹³. Skin hydration was assessed weekly using the SkinUp — Digital Skin

Analyzer, a portable instrument that accurately measures skin moisture, oil, and elasticity levels, classifying skin as: balanced (good levels); mildly imbalanced skin (slightly imbalanced levels); and severely imbalanced skin (imbalanced levels)¹⁴.

Data analysis

In the data analysis, descriptive statistics were used to characterize the sample, calculating the mean, frequency, and confidence interval. The data were analyzed using the software Statistical Package for Social Science (IBM SPSS®, USA) and Open Source Epidemiologic Statistics for Public Health (OpenEpi®).

Ethical aspects

This is an excerpt from the doctoral thesis titled “Use of liposomal gel and liposomal gel with chamomile in the prevention of radiodermatitis in cancer patients: randomized clinical trial”, approved by the Research Ethics Committee of the Faculty of Health Sciences of the University of Brasília (CEP/FS/UnB), approval number 3.123.117.

RESULTS

Thirty-three participants with HNC were included and monitored. Most were male (93.9%), with a mean age of 70 years, and were former smokers and alcohol drinkers. Only seven patients were not taking other medications during treatment; the majority used polypharmacy. Regarding radiotherapy, patients underwent an average of 33 radiotherapy sessions, with a mean total dose of 66 Gy and a mean dose of 2 Gy per fraction. Five participants underwent the electron-based radiotherapy protocol, and none received a boost. Other sociodemographic and clinical characteristics are presented in Table 1.

Table 2 presents the incidence of acute radiodermatitis and its grades. Radiodermatitis occurred in 93.9% of participants: erythema/hyperpigmentation (considered mild) occurred in 90.9% of participants, dry desquamation in 69.7%, and moist desquamation in 36.4%. Figures 1 and 2 demonstrate the manifestation of radiodermatitis in study participants. In the evaluation conducted 15 days after the end of the radiotherapy sessions, 19 (57.5%) patients presented some degree of radiodermatitis, with erythema/hyperpigmentation and dry scaling being the most prevalent.

Table 3 presents the symptoms reported by participants during the weeks of radiotherapy. The fifth week of treatment was the one with the highest number of symptom occurrences, with dry skin present in 68% of participants. Symptoms of heat, burning, and itching were also reported by most participants in the fifth week of radiotherapy. Regarding skin hydration, most participants showed a marked imbalance, which corresponds to skin with low moisture and oiliness. This imbalance can aggravate radiodermatitis and impair skin recovery because of the continuous action of ionizing radiation during treatment. It is noteworthy that no patient presented with balanced skin in any evaluation, which highlights the importance of skin care for older patients to keep it hydrated throughout radiotherapy, helping to maintain its integrity and prevent desquamation.

DISCUSSION

Radiation therapy is a frequently performed treatment for HNC in older adults, as a curative, adjuvant, or palliative treatment. Radiation therapy has the potential to significantly reduce patient symptoms and improve quality of life. With technological advances in recent years, radiation therapy has become more effective, but radiation toxicity remains an adverse effect¹⁵.

Radiation dermatitis in older adults can be impacted by a series of physiological changes inherent to aging, such as thinning of the epidermis, atrophy of the sebaceous glands, and reduced cellular regeneration capacity¹⁶. These factors can make older adults more susceptible to the toxicities of radiation therapy on the skin.

Radiation dermatitis is a common complication and adverse effect in patients undergoing radiation therapy. This study found that 93.9% of older adults with HNC developed this condition.

Table 1. Sociodemographic and clinical characteristics of participants. Brasília (DF), Brazil, 2025.

Sociodemographic and clinical characteristics	n=33
Age in years	70 (8.9)
Mean (SD) (min-max)	60-105
Male, n (%)	31 (93.9)
Schooling, n (%)	
Illiterate	8 (24.2)
Incomplete elementary education	15 (45.5)
Complete elementary education	4 (12.1)
Incomplete high school education	1 (3.0)
Complete high school education	4 (12.1)
Complete higher education	1 (3.0)
Phototype, n (%)	
II	1 (3.0)
III	5 (15.2)
IV	19 (57.6)
V	8 (24.2)
Smoker, n (%)	
Never smoked	4 (12.1)
Quit more than 6 months ago	11 (33.3)
Quit in the last 6 months	13 (39.4)
Currently smoking	5 (15.2)
Alcohol drinker, n (%)	
Never drinks	4 (12.1)
Quit more than 6 months ago	19 (57.6)
Quit in the last 6 months	6 (18.2)
Current drinker	4 (12.1)
Occupational exposure to the sun yes, n (%)	26 (78.8)
Diabetes yes, n (%)	3 (9.1)
Hypertension yes, n (%)	11 (33.3)
BMI, n (%)	
Underweight <18.5	4 (12.1%)
Healthy weight ≥18.5 and <24.9	24 (72.8%)
Overweight ≥25 and <29.9	3 (9.1%)
Obesity ≥30.0	2 (6.0%)
Staging, n (%)	
I	5 (15.1)
II	3 (9.1)
III	7 (21.2)
IVA	14 (42.4)
IVB	3 (9.1)
Not identified	1 (3.3)
Chemoradiotherapy	20 (60.6)
Radiotherapy only	13 (39.4)

BMI: body mass index.

Source: prepared by the authors.

Table 2. Incidence of acute radiodermatitis. Brasília (DF), Brazil, 2025.

Outcomes	(n=33)
Radiodermatitis, n (%)	31 (93.9)
Dose, mean	34.7 Gy
Erythema/Hyperpigmentation, n (%)	30 (90.9)
Dose, mean	35.2 Gy
Dry desquamation, n (%)	23 (69.7)
Dose, mean	41.0 Gy
Moist desquamation, n (%)	12 (36.4)
Dose, mean	49.3 Gy

Source: prepared by the authors.

**Figure 1.** Manifestation of radiodermatitis in a participant, which was classified as erythema. Brasília (DF), Brazil, 2025.**Figure 2.** Manifestation of radiodermatitis in a participant, which was classified as dry desquamation. Brasília (DF), Brazil, 2025.

In an observational study, 314 older patients with prostate cancer who underwent radiation therapy were followed. The authors showed that the presence of comorbidities and polypharmacy can increase skin susceptibility and develop acute radiation-induced side effects in this population¹⁷. Factors such as smoking, poor nutritional status, and chemoradiotherapy are associated with an increased risk of skin toxicity¹⁸. These factors were also observed in this study sample and are common in the HNC population.

Another study of elderly patients undergoing radiotherapy highlighted that the presence of comorbidities warrants a treatment approach that encompasses not only skin care but also the maintenance of physical and emotional health¹⁹.

Radiation dermatitis can impact the quality of life of older patients, given the symptoms of itching, pain, and local discomfort, as well as possible interruptions in radiotherapy due to the need for breaks for skin recovery²⁰. In this

Table 3. Symptoms reported and skin hydration in the irradiated region. Brasília (DF), Brazil, 2025.

Outcomes	1st week	3rd week	5th week	7th week
Symptoms in the irradiated area				
Heat, %	12.1	43.3	60.0	16.7
Burning, %	12.1	30.0	64.0	8.3
Itching, %	12.1	53.3	60.0	33.3
Dry skin, %	3.3	26.7	68.0	25.0
Local pain, %	3.3	10.0	20.0	0
Skin hydration				
Balanced skin, %	0	0	0	0
Slightly imbalanced skin, %	18.2	3.2	0	0
Severely imbalanced skin, %	81.8	96.8	100	100

Source: prepared by the authors.

study, symptoms were most prevalent in the fifth week of radiotherapy, which corresponds to an average of 50 Gy of ionizing radiation.

Regarding quality of life and cognitive function, approximately 55% of patients may experience decreased social function and cognitive impairment throughout treatment. Previous alcohol and tobacco use have been identified as factors that worsen quality of life and result in a worse prognosis²¹. In the case of older patients, this impact may be even greater.

Regarding skin hydration, most participants in this study presented with markedly imbalanced skin, demonstrating insufficient skin hydration. Dehydrated, oil-depleted skin becomes more vulnerable to the adverse effects of ionizing radiation, contributing to the worsening of radiodermatitis and hindering skin recovery due to the effects of ionizing radiation from subsequent radiotherapy sessions. Maintaining the integrity of the skin barrier and skin hydration are essential aspects in managing this adverse effect, an even greater challenge in older people.

Limitation of study

Regarding the limitations of this study, the reduced sample size was identified, especially in relation to the data collection period, since the research was carried out with a specific population of patients undergoing radiotherapy in a single service.

Recommendations

Regarding the recommendations, it is important to highlight the need to explore prevention and management strategies to minimize the incidence and severity of radiodermatitis in older patients with HNC undergoing radiotherapy. Approaches such as the use of topical products for skin hydration and protection, radiation dose fractionation techniques, and interventions for symptom control can play an important role in the quality of life of these patients.

Nurses should regularly monitor the skin of older patients during radiotherapy. This includes assessing early signs of radiodermatitis, such as mild erythema and symptoms such as local heat, as well as assessing skin hydration. This frequent monitoring allows interventions to prevent the development or worsening of radiodermatitis. Nurses play a key role in educating and guiding older patients with HNC and their families about the importance of skin care during radiotherapy.

CONCLUSION

The incidence of radiodermatitis was 93.9% in the sample of older patients with HNC during radiotherapy. Symptoms associated with this adverse effect were present in all study participants and were primarily reported in the fifth week of radiotherapy. All patients followed presented with marked skin imbalance.

Future studies are needed to investigate specific risk factors for this condition in older people to develop personalized and effective approaches for the prevention and management of radiodermatitis in older patients with HNC.

Acknowledgments: Not applicable.

Authors' contributions: AGM: project administration, formal analysis, conceptualization, data curation, writing – original draft, investigation, methodology, resources, supervision, visualization. LAO: conceptualization, methodology, supervision, validation, visualization. EBF: conceptualization, investigation, methodology, supervision, validation, visualization. PEDR: formal analysis, data curation, investigation, methodology, resources, visualization. FHES: conceptualization, writing – review & editing, validation, visualization.

Data availability statement: All data were generated or analyzed in the present study.

Funding: Not applicable.

Conflict of interest: None.

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