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DERMATITIS;

ACUTE VERSUS CHRONIC RADIO DERMATITIS WITH IONIZING RADIATION: A COMPARATIVE STUDY OF THEIR FREQUENCY OF PRESENTATION.

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ABSTRACT… Objectives: To assess the frequency of acute and chronic radio dermatitis in patients treated for various malignancies, via ionizing radiation. **Study Design:** Cross-sectional study. **Setting:** This multi-center, Outpatient Department of Dermatology Al-Tibri Medical College & Hospital Isra University Karachi campus, Departments of Dermatology and Oncology Dow University Hospital and Civil Hospital Karachi. **Period:** June 2015 till December 2016. **Methods:** Patients belonging to both genders and all age groups, fulfilling the inclusion criteria were included in the study. Selected patients underwent a detailed history and physical examination. Clinical diagnosis of radiation-induced dermatitis was made and relevant investigations were performed where needed. All findings were recorded, tabulated and analyzed. **Results:** The sample consisted of a 150 patients (35.3% male and 64.6% female). Minimum age was 11 years and maximum age was 82 years. Mean age was 46.4 with a SD of 14.5. All patients had received external beam radiation. Radiodermatitis was identified in 65 patients out of which acute radiodermatitis was encountered in 32.66% (of which 63.26% were male and 36.73% were female) while chronic radiodermatitis was found in 10.66% (of which 18.75% were male and 81.25% were female). Pigmentation, epilation and erythema were the most common manifestations while fibrosis and necrosis were least encountered manifestations. **Conclusion:** A number of patients develop acute or chronic radiodermatitis with or without associated variable cutaneous manifestations. Theseside effects of ionizing radiation significantly affect patient's quality of life, also disturbs the treatment schedule. In the present study acute radiodermatitis was found to be more prevalent than chronic radiodermatitis. However, further research is necessary in order to effectively prevent, manage and reduce such complications.

Key words: Ionizing, Radiation, Acute Radiodermatitis, Chronic Radiodermatitis, Epilation, Pigmentation, Erythema, Fibrosis, Necrosis.

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BACKGROUND

The role of radiation therapy in the management of cancer is an important aspect of the oncological approach to malignancies.[1] The purpose behind the usage of radiation therapy involves destruction of cancer cells as well as minimal normal cell damage.[2] Ionizing radiation in particular involves the emission of energy that is strong enough to remove an electron from outer most orbit of an atom. This particular radiation can exist in an electromagnetic form or a particulate form. Literature suggests that most patients are able to toleratesuch radiation without observable side effects. However, approximately 5-10% of patients do have an increased tendency to exhibit cutaneous manifestations of radiation toxicity.[3] Due to the painful nature of such side effects as well as their impact on the quality of life, it is noted to play a role in adherence to treatment, tolerance and schedule.[4]

The adverse cutaneous effects of radiation therapy include acute radiodermatiits, chronic radiodermatitis, and other late manifestations which include both benign and malignant skin changes. Acute radiodermatitis is classically defined as a skin reaction occurring during the first 7-10 days following radiotherapy. It consists of several stages, initially beginning with erythema and progressing to pigmentation,

alopecia and desquamation upon dosage increment. Desquamation can be either dry or wet and may even progress to eventual necrosis.[5] Various options are available for treating radiodermatitis as well-recommended therapies like mild or moderate potency topical corticosteroids.[6] Water Jel R1 and R2 preparation[7], topical olive oil, chamomile, almond oil and aloe Vera preparations[8], topical anti-oxidants[9], photobiomodulation[10] and low level laser therapy[11,12] are modalities used as alternative therapies for treatment and/or prevention of radiodermatitis. Chronic radiodermatitis usually occurs 3-10 weeks after radiotherapy. It is characterized by scaling, atrophy, telangiectasia, subcutaneous fibrosis and necrosis. Literature assessing radio dermatitis of any type is lacking in our part of the world. Hence this study was conducted in order to assess the frequency of acute and chronic dermatitis following ionizing radiation therapy.

METHODOLOGY

This is a multi-center, cross-sectional studyconducted, using a sample size generated from patients attending the outpatient department of Dermatology Al-Tibri Medical College & Hospital, Isra University Karachi Campus, departments of Dermatology and Oncology Dow university Hospital and Civil Hospital, Karachi. The study started on June 2015 and concluded on December 2016. An exclusion and inclusion criteria using non-probability convenient sampling was established which aided in creating a sample population for the study. Patients belonging to both genders and all age groups, who gave consent to be registered, were enrolled. Only patients developing cutaneous manifestations after exposure to radiation therapy were included. All patients were noted to be receiving external beam radiotherapy.

Patients with pre-existing primary dermatoses as well as dermatoses secondary to systemic diseases and those on systemic or topical treatment were excluded. All patients were subjected to a detailed history and physical examination which included general, systemic and dermatological components. A clinical diagnosis of radiation-induced dermatologic changes was established by consultant dermatologist using RTOG (Radiotherapy Oncology Group) criteria for radiodermatitis.[13] This uses ordinal scale 0-4. Investigations such as scraping for fungi, culture swabs and tzanck smears were performed in grey cases. Biochemical profiles and skin biopsies were undertaken only where required. A predesigned proforma was used to document different findings. All findings were compiled, tabulated and analyzed via SPSS.

RESULTS

A total of 150 patients presented with different types of radiation induced skin changes during study period, out of these 150, 53 (35.3%) were males and 97 (64.6%) were females. The minimum age of presentation was 11 years and the maximum 82 years (Table-I). The mean age was calculated to be 46.4 ± 14.5 years.

Age Range	Male (n=53)	Female (n=97)	Total (n=150)	Percentage
11-20 years	2	3	5	3.3%
21-30 years	2	7	9	6%
31-40 years	8	33	41	27.33%
41-50 years	11	26	37	24.66%
51-60 years	19	17	36	24%
61-70 years	9	6	15	10%
71-80 years	1	3	4	2.66%
81-90 years	1	2	3	2%

Acute versus Chronic radiodermatitis with ionizing radiation: A comparative study of their frequency of presentation

The frequencies of different manifestations, both acute and chronic radio dermatitis, are documented in Table-II and Table-III respectively. Radiodermatitis was noted in 65 patients out of which acute radio dermatitis was encountered in 49 (32.66% of the total sample) patients from which 31 were males (63.26%) and 18 were females (36.73%). The most frequently seen manifestations were erythema, epilation and pigmentation whereas the least commonly seen manifestation was necrosis. Chronic radiodermatitis was encountered in 16 patients (10.66% of the total sample), from which 3 were males (18.75%) and 13 were females (81.25%). The most frequently seen manifestations for chronic radiodermatitis were pigmentation and epilation while fibrosis and necrosis were encountered much less frequently.

	Male (n=31)	Female (n=18)	Total (n=49)	Percentage
Erythema	31	18	49	100%
Epilation	31	18	49	100%
Pigmentation	31	18	49	100%
Moist desquamation	27	14	41	83.6%
Dry desquamation	5	3	8	16.32%
Ulceration	2	6	8	16.32%
Necrosis	0	2	2	2%

Table-II. Acute radio dermatitis

	Male (n=3)	Female (n=13)	Total (n=16)	Percentage
Pigmentation	3	13	16	100%
Epilation	3	13	16	100%
Telangiectasia	3	7	10	62.5%
Scaling	3	7	10	62.5%
Atrophy	2	7	9	56.25%
Fibrosis	0	1	1	6.25%
Necrosis	1	0	1	6.25%

Table-III. Chronic radio dermatitis

DISCUSSION

Radiotherapy is a widely used and accepted method for treating malignancies with already known and documented cutaneous side effects. Radiodermatitis has been documented in research as the most commonly occurring side effect of radiotherapy.[8] Studies suggest that approximately 85% of patients treated with ionizing radiation will eventually develop moderate-to-severe cutaneous side effects.[14] One study in particular noted the severity of the cutaneous side effects to be directly related to the radiotherapy schedule, total dose, treated skin area and the type of radiation involved, as is also consistent with the findings of our own study.[15] Such side effects are noted to reduce patient's compliance and can also function as limiting factors in association with adhered to radiotherapy scheduling and protocols. Additionally, patients often experience and complain of anxiety related the cosmetic nature of radiodermatitis which may further lead to stigmatization and an impaired quality of life.[16]

According to the findings above, acute radiodermatitis occurred with a frequency of 32.66% while chronic radiodermatitis occurred with a frequency of 10.66%. Another study noted the frequency of chronic radio dermatitis in its sample population to be 9%, comparable to our study.[17] It can also be noted that epilation and pigmentation were the most common findings for both acute and chronic radiodermatitis. These findings have previously been noted in other studies, despite some variation in frequency due to modifiable factors such as study design, setting as well as radiation dosage[18,19] Hanks et al[20], in particular, noted a similar frequency of erythema comparable to our study and attributed it to the dosage of radiation administered to the patient. This finding has also been reported by Yamazaki et al.[18] Therefore, the degree of erythema experienced as a side effect increases

as the radiation dosage is increased.

Epilation, also otherwise known as hair loss, was another commonly encountered manifestation as a part of both acute and chronic radiodermatitis. Other studies have also documented the frequency with which epilation occurs with radiotherapy, particularly its relationship to the dosage of radiotherapy. One study in particular noted that by fractionating the radiation dosage till a certain limit, epilation can be avoided.[21] Fibrosis and necrosis, on the other hand, were the least encountered manifestations of both acute and chronic radiodermatitis. Another study conducted by Seegenschmiedt and colleagues[22], also reported the same frequency of necrosis and fibrosis with very little variability.

CONCLUSION

Radiation therapy causes significant rates of acute and chronic radiodermatitis with associated variable cutaneous manifestations. It not only affects patient's quality of life but also hinders treatment schedule. In the present study acute radiodermatitis was found to be more frequent than chronic radio dermatitis. Since ionizing radiation is an important modality in cancer management, in order to minimize or more effectively manage the cutaneous side effects of the therapy, further research is necessary in our part of the world, especially as for as the preventive measures are concerned.

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Good relations are like needles of clock, They only meet for sometime but always stay connected.

– Unknown –

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
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2	Sadaf Ahmed	Drafting of article, critical analysis.	
3	Humaira Talat	Compiling of data, Drafting article.	
4	Raja Samir Khan	Compiling of data, Statistical analysis.	
5	Mehnaz Gitay	Formuting and reviewing this article.	
6	Asim Hameed	Compiling of data.	