Indonesian Journal of Global Health Research
Volume 6 Number 6, December 2024
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

EXPERIENCES OF BREAST CANCER PATIENTS WITH ACUTE SKIN TOXICITY UNDERGOING RADIOTHERAPY

Nia Mitra Agustin[1]*, Arina Widya Murni[2], Emil Huriani[1]
[1]Faculty of Nursing, Universitas Andalas, Limau Manis, Pauh, Padang, Sumatera Barat 25175, Indonesia
[2]Faculty of Medicine, Universitas Andalas, Limau Manis, Pauh, Padang, Sumatera Barat 25175, Indonesia
*niamitra.agustin@gmail.com

ABSTRACT
Radiotherapy for breast cancer has been proven to be highly effective, able to significantly reduce the risk of recurrence and lower the risk of death in the long term. However, behind these great benefits, there are side effects that need to be considered, such as skin toxicity, which can have a significant impact on the patient's physical and psychological condition. Therefore, it is necessary to review various literature to determine the various experiences of breast cancer patients with acute skin toxicity who underwent radiotherapy. Objective: To explore and analyze the experiences of breast cancer patients with acute toxicity undergoing radiotherapy through the literature. Method: Search for articles using the keywords acute skin toxicity AND breast cancer AND experience AND radiotherapy. Articles were searched through three online databases, namely sciencedirect (n = 43 articles), pubmed (n = 38 articles), and proquest (n = 32 articles). A total of 113 articles were collected through the data base. Through three screening processes that met the criteria, 4 articles were obtained. Results: This study found an outline of the classification of themes that emerged, namely: physical, functional, psychological impacts, and prevention of skin disorders due to radiotherapy as well as knowledge of breast cancer patients regarding radiotherapy. It is hoped that the results of this research can contribute to improving health care by expanding the scope of services to not only cover physical problems but also non-physical.

Keywords: acute skin toxicity; breast cancer; experience; radiotherapy

First Received	Revised	Accepted
28 March 2024	28 April 2024	30 April 2024
Final Proof Received		**Published**
19 July 2024		01 December 2024

How to cite (in APA style)
Agustia, N. M., Murni, A. W., & Huriani, E. (2024). Experiences of Breast Cancer Patients with Acute Skin Toxicity Undergoing Radiotherapy. Indonesian Journal of Global Health Research, 6(6), 3725-3734. Retrieved from https://jurnal.globalhealthsciencegroup.com/index.php/IJGHR/article/view/3861.

INTRODUCTION

Each year, 10.9 million people worldwide are diagnosed with cancer, and about 50% of them require radiotherapy (American Cancer Society, 2019). Radiotherapy is a primary non-surgical conservative therapy for the curative treatment of cancer. In breast cancer, radiation therapy has been shown to reduce the risk of recurrence by about 50% within 10 years and lower the risk of death from cancer by 20% within 15 years after therapy (Early Breast Cancer Trialists' Collaborative Group, 2011). However, radiotherapy also has physical side effects and psychological impacts on patients(Fitriatuzzakiyyah et al., 2017). One of the physical side effects of radiotherapy is skin toxicity, which is experienced by 70%-100% of early-stage breast cancer patients (Andersen et al., 2018). Skin toxicity reactions appear within 1-4 weeks of treatment, and symptoms include erythema, dry skin peeling, and moist desquamation (Knobf & Sun, 2005). Fifty-five percent of patients experience symptoms such as dry, red, and itchy skin six months post-radiotherapy (Sjövall et al., 2010). Ninety-eight percent experience grade 1-2 skin toxicity, which is concerning as it may lead to new types of cancer, such as skin cancer, if proper preventive measures are not taken (Prajogi & Djakaria, 2010).

Radiotherapy can also cause advanced skin toxicity effects such as pigmentation changes, subcutaneous fibrosis, and edema. These effects are observed in 25% of patients with mild to moderate toxicity and in less than 5% of patients with severe toxicity (Khanna et al., 2013). The severity of toxicity is influenced by factors such as the type and energy of the radiation, treatment techniques, location and volume of the irradiated tissue, dose, timing, and fractionation (Khanna et al., 2013; Seité et al., 2017). Anatomical areas that are particularly vulnerable include skin folds around the breast, the inguinal area, thin skin, mucous membranes, and previously damaged skin. Other risk factors include a high body mass index, large breast size, and smoking Skin toxicity can hinder the radiotherapy process, as the treatment may need to be stopped early to prevent more severe toxicity (Fuzissaki et al., 2019). This can also lead to decreased work productivity, increased wound care costs, social isolation, and disturbances in body image. Additionally, skin toxicity affects daily routines due to changes in the treatment plan, increased physical discomfort, and changes in the appearance of the breast (Beamer & Grant, 2018).

In addition, skin toxicity also causes psychological well-being issues such as anxiety, stress, low self-esteem, and depression (Sutherland et al., 2017). These symptoms are exacerbated by changes in skin color, hyperpigmentation, dry skin, and sensations of heat, all of which contribute to decreased psychological well-being and quality of life for patients (Chu et al., 2021). Patients may also experience frustration, fear of the future, and concerns that their skin toxicity will interfere with the treatment process they are undergoing (Andersen et al., 2018). Patients with skin toxicity experience psychological impacts, leading them to feel the need for support and information (Andersen et al., 2018). Fourteen percent of breast cancer patients undergoing radiotherapy choose to discontinue their treatment due to experiencing skin toxicity. A better understanding of the experience of skin toxicity from the patient's perspective is essential during treatment (Fuzissaki et al., 2019).. Additionally, the role of healthcare professionals is crucial in identifying side effects and providing holistic care, as well as managing patients with skin toxicity during radiotherapy (Cardozo et al., 2020; Ginex et al., 2020). The aim of this study is to conduct a literature review on the experiences of breast cancer patients with acute skin toxicity undergoing radiotherapy. Based on the background provided, there is a need for a research review on the experiences of breast cancer patients with acute skin toxicity during radiotherapy. This literature review aims to analyze the experiences of breast cancer patients with acute skin toxicity undergoing radiotherapy through a review of existing literature

METHOD

The type of research used is a literature review (LR). The researcher employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist and the Critical Appraisal Skills Programme (CASP) to assess the quality of the reviewed articles (Critical Appraisal Skills Programme, 2018). To collect articles, the author conducted a search using three online databases: PubMed, ScienceDirect, and ProQuest. The keywords used were: acute skin toxicity AND breast cancer AND experience AND radiotherapy. The selection decision was based on the following inclusion criteria: 1) The article topic must be related to the experiences of patients diagnosed with breast cancer who have acute skin toxicity and are undergoing radiotherapy; 2) The research method must be any type of qualitative research (Phenomenology, Grounded Theory); 3) The article must be available in English; 4) Publication years must be between 2018 and 2024; 5) The study subjects must be breast cancer patients with acute skin toxicity undergoing radiotherapy; 6) The article must be an original, full-text article. In addition to the inclusion criteria, the following exclusion

criteria were also established: 1) Quantitative research methods, mixed methods, literature reviews, and case reports.

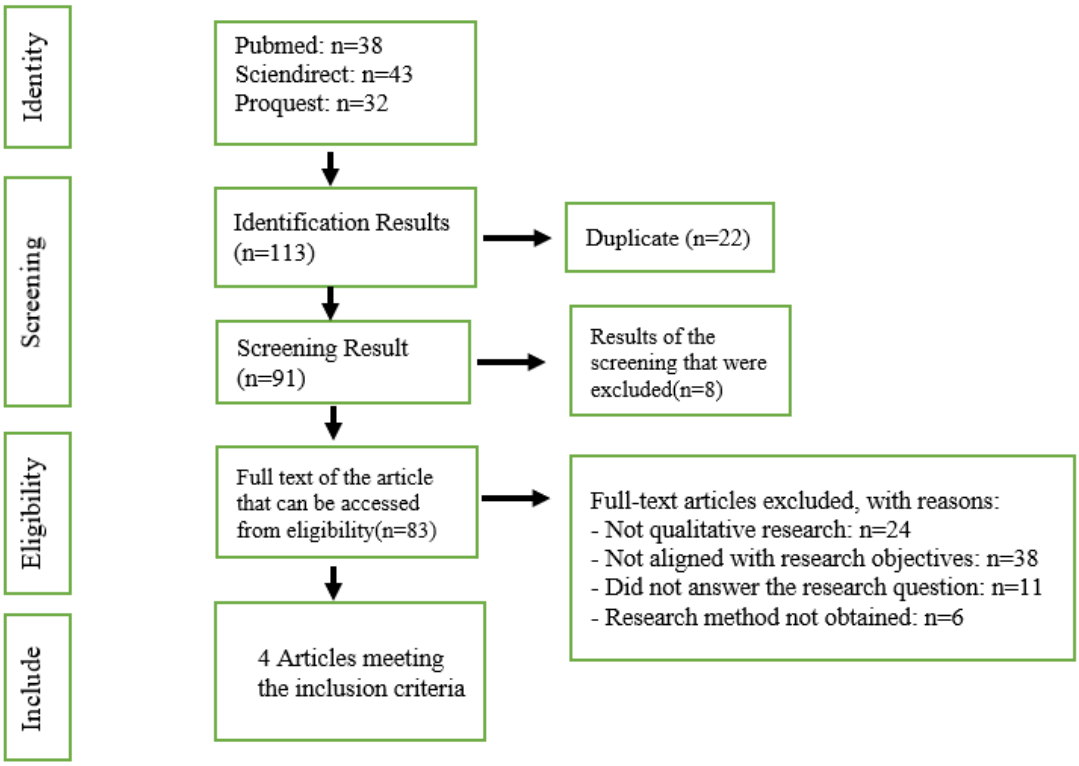

Figure 1. PRISMA Diagram

The search using three online databases identified 113 articles. After screening, 22 duplicate articles were removed, leaving 91 articles. The researcher then assessed the remaining articles based on the inclusion criteria, resulting in the exclusion of 24 articles that were not qualitative research, 38 articles that did not meet the research objectives, 11 articles that did not answer the research question, and 6 articles where the research method could not be determined, leaving 4 articles. Based on the analysis of these four articles, the journals include international publications from the Journal of Multidisciplinary Healthcare, Asia-Pacific Journal of Oncology Nursing, and Supportive Care in Cancer. All four reviewed articles share a common research objective: to explore the experiences of breast cancer patients with acute skin toxicity undergoing radiotherapy. The studies were conducted in various locations, including Norway, China, and the USA, demonstrating that the experiences of breast cancer survivors from diagnosis and treatment to the end of therapy vary across different countries and present challenges for nurses in understanding the diverse conditions patients face. After screening, the four articles that met the criteria were further evaluated for quality and risk of bias using the Critical Appraisal Skills Programme (CASP), which includes 10 items used for the systematic review of qualitative research (Table 1) (Critical Appraisal Skills Programme, 2018).

RESULTS

From the search results of the articles, the researcher organized the studies into a structured table format arranged by publication date. The table includes the following details: author names, publication year, study title, research objectives, methods and themes, recommendations, and quality assessment. This table summarizes the key information from the articles and is presented as Table 1 below:

Table 1.
Characteristics of the Studies

Title & *Author*	Aims	Method	Theme
Women's experience of acute skin toxicity following radiation therapy in breast cancer Peneliti: Andersen, E. R., Eilertsen, G., Myklebust, A. M., & Eriksen, S. (2018). (Williams & Jeanetta, 2016) Tempat: Nowegia	Understanding the Experiences of Patients with Acute Skin Toxicity During Radiation Therapy for Breast Cancer	Research Methodology: Qualitative Study Sample: • 7 women with breast cancer experiencing acute skin toxicity (purposive sampling) Method: • Semi-structured interviews conducted 2-3 weeks post-treatment, lasting 35-70 minutes, and recorded. • Interview guide covering 5 areas: skin reaction experience, daily life experience, coping strategies, information experience, and post-treatment experience. Inclusion Criteria: • Women aged >18 years • Post lumpectomy or mastectomy surgery • Undergoing external radiation therapy 2Gy x 25 or 2.67 Gy x 15 (curative intent) • Able to speak and read Norwegian • One or more symptoms of skin reaction • Signed written informed consent Exclusion Criteria: • Previous radiation therapy to the chest or chest wall • Cancer ulceration or infiltration into the skin	▪ Unique skin experience ▪ Psychological aspects ▪ Information experience
A qualitative analysis of acute skin toxicity among breast cancer radiotherapy patients Peneliti: Schnur, J. B., Ouellette, S. C., Dilorenzo, T. A., Green, S., & Montgomery, G. H. (2018) Tempat: USA	Understanding the Experiences of Patients with Acute Skin Toxicity During Radiation Therapy for Breast Cancer	Research Methodology: Qualitative Study Sample: • 20 women with breast cancer experiencing acute skin toxicity Method: • Semi-structured interviews with an average interview duration of 25 minutes (15-35 minutes) Inclusion Criteria: • Patients with cancer stage 0-III • Receiving radiotherapy • English-speaking • Aged >18 years • Willing to participate in the interview • Receiving external radiotherapy in a supine position	• Skin changes affect various dimensions of quality of life during radiation treatment. • Individual differences influence women's experiences. • Women use various symptom management strategies, including self-medication, complementary/alternative medicine approaches, and psychological strategies

		• Radiotherapy conducted 5 workdays per week Exclusion Criteria: • Significant cognitive impairment	
Skin-related Quality of Life among Midwestern US Community-based Women with Breast Cancer Experiencing Radiodermatitis Peneliti: Beamer, L. C., Grant, M (2019) Tempat: USA	Exploring the quality of life of women receiving radiotherapy who are experiencing breast radiodermatitis.	Research Methodology: Qualitative Study Sample: • 28 women with breast cancer experiencing radiodermatitis (purposive sampling) Method: • Semi-structured interviews with an interview duration of 60-75 minutes Inclusion Criteria: • Young women diagnosed with premenopausal breast cancer who have completed active breast cancer treatment at the start of the study	• Sensations caused by radiodermatitis • Perspectives on radiodermatitis • Prevention of radiodermatitis • Emotions caused by skin changes • Knowledge and preparation for radiotherapy • Physical appearance of breast skin
Acute skin toxicity and self-management ability among Chinese breast cancer radiotherapy patients: a qualitative study Peneliti: Lu, X., Yin, Y., Geng, W., Liu, L., Zhang, Z. (2024) Tempat: China	Gaining a deeper understanding of the actual experiences and self-management strategies of breast cancer patients undergoing radiotherapy with acute skin toxicity.	Research Methodology: Qualitative Study Sample: • 17 women with breast cancer experiencing acute skin toxicity (purposive sampling) Method: • Semi-structured interviews with a duration of 45-70 minutes Inclusion Criteria: • Aged 18 years or older • Diagnosed with breast cancer based on pathology reports • Currently undergoing radiotherapy or have completed radiotherapy within the last 30 days • Voluntarily agreed to participate in the study Exclusion Criteria: • Serious complications from other diseases (heart, lung, kidney, liver, and other organs) • Patients with severe mental or psychological disorders • Language barriers that hinder communication	• Self-reported experiences and feelings of radiation dermatitis • Impact on quality of life • Ability to manage it independently • Challenges faced Subcategory:Lack of information during radiotherapy

DISCUSSION

Based on the analysis of five articles included in the systematic review, four themes were identified: psychological impact, functional impact, physical impact, skin disturbance prevention, and patient knowledge. The study illustrates the experiences of breast cancer patients with acute skin toxicity undergoing radiotherapy. The review of these articles reveals five main themes: physical impact, psychological impact, functional impact, skin disturbance prevention, and patient knowledge. Of the five articles, three address the physical impact of acute skin toxicity on breast cancer patients undergoing radiotherapy. Skin toxicity resulting from radiotherapy is a significant and complex issue faced by these patients during treatment.

Fuzissaki et al., (2019) reported that 14% of breast cancer patients undergoing radiotherapy chose to discontinue their treatment due to the adverse effects of skin toxicity, such as dry skin, redness, and even burns. These changes not only have physical effects but also have significant psychological implications, affecting patients' body image and emotional well-being during and after treatment.

This condition can lead to a decline in overall quality of life and highlights the need for comprehensive support in addressing the psychological aspects of breast cancer treatment. Sutherland et al.,(2017) found that patients often experience psychological symptoms such as anxiety, stress, and depression as a direct response to these changes. Chu et al., (2021) investigated how drastic changes in the skin can disrupt a patient's self-image and increase concerns about treatment outcomes and future physical appearance. Functional impacts are also evident in breast cancer patients experiencing acute skin toxicity during radiotherapy. Discomfort related to skin toxicity can interfere with various aspects of daily functioning. Breast cancer patients undergoing radiotherapy often face various challenges and experiences throughout their treatment journey. Studies have shown that these patients may not always express all the side effects they encounter, impacting their daily activities and psychological well-being [1]. Patients receiving External-Beam RadioTherapy (EBRT) may find it disruptive to their routines and dissatisfying due to discomfort and side effects, while those undergoing TARGeted Intraoperative radioTherapy (TARGIT-IORT) perceive it as efficient and less disruptive, with minimal impact on their quality of life(Esteban-Zubero et al., 2019). Coping styles play a crucial role in the quality of life of breast cancer patients undergoing radiotherapy, with maladaptive avoidance coping strongly linked to poorer quality of life, especially in patients, highlighting the need for effective interventions during treatment(Roszkowska & Białczyk, 2023). Additionally, the treatment continuum for breast cancer patients involves physical and psychological changes, impacting their quality of life and necessitating support from family and alternative medicine to cope with chemotherapy(Astari et al., 2023). In the treatment of early breast cancer, adjuvant moderately hypofractionated regimens are recommended, along with techniques like gating and simultaneous integrated boost, to abbreviate treatment time and improve outcomes (Ruysscher & Belderbos, 2020;Jacobs et al., 2023).

Breast cancer patients undergoing radiotherapy often experience acute skin toxicity, impacting their quality of life. Research indicates that factors like body mass index, diabetes, smoking history, higher ferritin levels, high-sensitivity C-reactive protein, and specific lymphocyte subsets are associated with an increased risk of severe acute radiation dermatitis (ARD) (Xie et al., 2023). Studies have shown variations in skin toxicities over time, with factors like obesity, type of surgery, tumor phenotype, age, and lifestyle habits influencing the occurrence of skin reactions. Additionally, there are significant racial/ethnic differences in reported skin symptoms, emphasizing the importance of incorporating patient-reported outcomes in assessing skin toxicities during radiotherapy (Acosta et al., 2023). Hypofractionated radiotherapy has been found to lead to less severe acute skin toxicity compared to conventional fractionated radiotherapy, with BMI, radiotherapy type, and inflammatory biomarkers playing crucial roles in skin toxicity outcomes (Zhang et al., 2023). Furthermore, different radiation schedules have been compared, showing comparable acute skin toxicity but better cosmetic outcomes with a shorter radiotherapy schedule (Bruand et al., 2022; Yadav et al., 2023).

Lu et al., (2024) revealed that household activities can exacerbate discomfort for patients undergoing skin toxicity from radiotherapy. Patients experience additional pain during

activities, such as cooking on a hot stove, and also suffer from bothersome itching that can affect their ability to sleep comfortably. This condition demonstrates that skin toxicity not only affects patients' physical comfort in daily life but also limits their ability to perform routine activities and impacts their sleep quality. Breast cancer patients experiencing skin toxicity during radiotherapy require effective prevention strategies to mitigate its negative impacts. Andersen et al., (2018) emphasize the importance of proper skin care for breast cancer patients undergoing radiotherapy. Patients use moisturizing creams and gentle lotions to maintain hydration for skin affected by radiation. Additionally, the use of dressings and saline applications can help alleviate the heat or itching sensations often experienced by patients. Patients also choose clothing that protects the skin from direct sunlight, opting for soft, non-irritating fabrics(İnan et al., 2022). Breast cancer patients undergoing hypofractionated whole breast irradiation with simultaneous integrated boost experienced low-grade acute skin toxicity, with 1.2% reporting grade 2 toxicity(Chitapanarux et al., 2023).

Radiotherapy can seem endless, as it exacerbates discomfort, increases visible changes, and often leads to heightened stress over time. Due to the daily adverse effects of radiotherapy, many patients adopt short-term self-management strategies to cope with the present moment. Therefore, comprehensive knowledge of radiotherapy has a significant positive impact on patients experiencing skin toxicity during the treatment process. A good understanding of radiotherapy helps patients anticipate and better manage side effects such as skin toxicity. This awareness allows them to recognize potential symptoms like redness, itching, and burning sensations that may arise as a result of the treatment(Beamer & Grant, 2019). The more knowledge patients have about the radiotherapy process, the better they can prepare themselves to face the physical and psychological changes that may occur. This knowledge not only prepares them psychologically but also helps them manage daily life, such as choosing appropriate clothing and navigating social interactions that may be affected by their skin condition. Thus, an informed approach to radiotherapy not only empowers patients personally but can also enhance their overall experience during the treatment process

CONCLUSION

This literature review identifies five main themes from the experiences of breast cancer patients with acute skin toxicity undergoing radiotherapy: physical impact, psychosocial impact, functional impact, skin disturbance prevention, and knowledge about radiotherapy. These themes can affect patients' decisions about continuing treatment, raise psychological concerns during treatment, and disrupt daily activities. Effective prevention strategies are crucial during radiotherapy to reduce the negative effects of acute skin toxicity, and a comprehensive understanding of radiotherapy helps patients anticipate and manage side effects.This study reveals that breast cancer patients experiencing acute skin toxicity during radiotherapy face significant psychological, physical, and functional impacts. These challenges, including physical discomfort, changes in appearance, and emotional stress, affect their quality of life. A thorough understanding of the radiotherapy process helps patients prepare psychologically and manage side effects like redness, itching, and burning. Thus, an informed approach and comprehensive support are essential for improving patients' experiences and mitigating the negative impacts of skin toxicity during treatment.

REFERENCES

Acosta, L. G., Takita, C., Reis, I. M., Wright, J. L., Zhao, W., & Hu, J. J. (2023). Abstract 3052: Patient- and clinician-reported outcomes of radiotherapy-related acute skin toxicities in a tri-racial/ethnic breast cancer population. Cancer Research, 83(7_Supplement), 3052. https://doi.org/10.1158/1538-7445.AM2023-3052

American Cancer Society. (2019). Breast Cancer Facts & Figures 2019-2020.

Andersen, E. R., Eilertsen, G., Myklebust, A. M., & Eriksen, S. (2018). Women's experience of acute skin toxicity following radiation therapy in breast cancer. Journal of Multidisciplinary Healthcare, 11, 139–148. https://doi.org/10.2147/JMDH.S155538

Astari, A. M., Hayati, Y. S., AR, D. I. P., & Laksana, K. (2023). The Experience of Breast Cancer Undergoing Chemotherapy. Jurnal Aisyah : Jurnal Ilmu Kesehatan, 8(2), 21–26. https://doi.org/10.30604/jika.v8i2.1528

Beamer, L. C., & Grant, M. (2018). Longitudinal trends in skin-related and global quality of life among women with breast radiodermatitis: A pilot study. European Journal of Oncology Nursing, 33(December 2017), 22–27. https://doi.org/10.1016/j.ejon.2018.01.008

Beamer, L. C., & Grant, M. (2019). Skin-related quality of life among Midwestern US Community-based women with breast cancer experiencing radiodermatitis. Asia-Pacific Journal of Oncology Nursing, 6(1), 50–56. https://doi.org/10.4103/apjon.apjon_40_18

Bruand, M., Salleron, J., Guihard, S., Crety, C. M., Liem, X., Pasquier, D., Lamrani-Ghaouti, A., Charra-Brunaud, C., Peiffert, D., Clavier, J. B., Desandes, E., & Faivre, J. C. (2022). Acute skin toxicity of conventional fractionated versus hypofractionated radiotherapy in breast cancer patients receiving regional node irradiation: the real-life prospective multicenter HYPOBREAST cohort. BMC Cancer, 22(1), 1–10. https://doi.org/10.1186/s12885-022-10402-z

Cardozo, A. D. S., Simões, F. V., Santos, V. O., Portela, L. F., & da Silva, R. C. (2020). Severe radiodermatitis and risk factors associated in head and neck cancer patients. Texto e Contexto Enfermagem, 29, 1–15. https://doi.org/10.1590/1980-265X-TCE-2018-0343

Chitapanarux, I., Nobnop, W., Onchan, W., Klunklin, P., Nanna, T., Sitathanee, C., Kulpisitthicharoen, S., & Sripan, P. (2023). Hypofractionated whole breast irradiation with simultaneous integrated boost in breast cancer using helical tomotherapy with or without regional nodal irradiation: A report of acute toxicities. Frontiers in Oncology, 13(March), 1–7. https://doi.org/10.3389/fonc.2023.1122093

Chu, C. N., Hu, K. C., Wu, R. S. C., & Bau, D. T. (2021). Radiation-irritated skin and hyperpigmentation may impact the quality of life of breast cancer patients after whole breast radiotherapy. BMC Cancer, 21(1), 1–8. https://doi.org/10.1186/s12885-021-08047-5

Critical Appraisal Skills Programme. (2018). CASP Qualitative Checklist. Critical Appraisal Skills Programe, 2018, 1.

Early Breast Cancer Trialists' Collaborative Group. (2011). Relevance of breast cancer hormone receptors and other factors to the effi cacy of adjuvant tamoxifen: patient-level meta-analysis of randomised trials. Comprehensive Cancer CentreHealth Service & Population Research, 378(9793), 771–784.

Esteban-Zubero, E., García-Muro, C., Alatorre-Jiménez, M. A., Marín-Medina, A., López-García, C. A., Youssef, A., & Villeda-González, R. (2019). Management of Community

acquired pneumonia in the Emergency Room. Iberoamerican Journal of Medicine, 1(1), 3–15. https://doi.org/10.53986/ibjm.2019.0002

Fitriatuzzakiyyah, N., Sinuraya, R. K., & Puspitasari, I. M. (2017). Cancer Therapy with Radiation: The Basic Concept of Radiotherapy and Its Development in Indonesia. Indonesian Journal of Clinical Pharmacy, 6(4), 311–320. https://doi.org/10.15416/ijcp.2017.6.4.311

Fuzissaki, M. de A., Paiva, C. E., Oliveira, M. A. de, Lajolo Canto, P. P., & Paiva Maia, Y. C. de. (2019). The Impact of Radiodermatitis on Breast Cancer Patients' Quality of Life During Radiotherapy: A Prospective Cohort Study. Journal of Pain and Symptom Management, 58(1), 92-99.e1. https://doi.org/10.1016/j.jpainsymman.2019.03.017

Ginex, P. K., Backler, C., Croson, E., Horrell, L. N., Moriarty, K. A., Maloney, C., Vrabel, M., & Morgan, R. L. (2020). Radiodermatitis in patients with cancer: Systematic review and meta-analysis. Oncology Nursing Forum, 47(6), E225–E236. https://doi.org/10.1188/20.ONF.E225-E236

İnan, G. A., Aral, I. P., Arslan, A., Celik, T. O., Ozturk, H. F., Arslan, S. A., & Tezcan, Y. (2022). Helical tomotherapy experience in breast cancer adjuvant radiotherapy and acute toxicity results. Reports of Practical Oncology and Radiotherapy, 27(6), 973–981. https://doi.org/10.5603/RPOR.a2022.0121

Jacobs, J. E. J., L'Hoyes, W., Lauwens, L., Yu, Y. L., Brusselmans, M., Weltens, C., Voigt, J. U., Wildiers, H., Neven, P., Herrmann, J., Thijs, L., Staessen, J. A., Janssens, S., & Van Aelst, L. N. L. (2023). Mortality and major adverse cardiac events in patients with breast cancer receiving radiotherapy: The first decade. Journal of the American Heart Association, 12(8). https://doi.org/10.1161/JAHA.122.027855

Khanna, N., Kumar, D., Laskar, S., & Laskar, S. (2013). Radiation dermatitis: An overview. Indian Journal of Burns, 21(1), 24. https://doi.org/10.4103/0971-653x.121877

Knobf, M. T., & Sun, Y. (2005). A longitudinal study of symptoms and self-care activities in women treated with primary radiotherapy for breast cancer. Cancer Nursing, 28(3), 210–218. https://doi.org/10.1097/00002820-200505000-00010

Lu, X., Yin, Y., Geng, W., Liu, L., Liu, F., & Zhang, Z. (2024). Acute skin toxicity and self-management ability among Chinese breast cancer radiotherapy patients: a qualitative study. Supportive Care in Cancer, 32(6), 1–11. https://doi.org/10.1007/s00520-024-08583-3

Prajogi, G. Ben, & Djakaria, M. (2010). Interupsi dalam Proses Terapi Radiasi. In Journal of the Indonesian Radiation Oncology Society (Vol. 1, Issue 1).

Roszkowska, M., & Białczyk, K. (2023). Coping Styles and Quality of Life in Breast Cancer Patients Undergoing Radiotherapy. Cancers, 15(23). https://doi.org/10.3390/cancers15235515

Ruysscher, D. K. M., & Belderbos, J. S. A. (2020). Recent advances in radiotherapy for lung cancer. Lung Cancer Therapy Annual 7, 128–137. https://doi.org/10.3109/9781841848679-13

Seité, S., Bensadoun, R. J., & Mazer, J. M. (2017). Prevention and treatment of acute and chronic radiodermatitis. Breast Cancer: Targets and Therapy, 9, 551–557. https://doi.org/10.2147/BCTT.S149752

Sjövall, K., Strömbeck, G., Löfgren, A., Bendahl, P. O., & Gunnars, B. (2010). Adjuvant radiotherapy of women with breast cancer - Information, support and side-effects. European Journal of Oncology Nursing, 14(2), 147–153. https://doi.org/10.1016/j.ejon.2009.09.002

Sutherland, A. E., Bennett, N. C., & Herst, P. M. (2017). Psychological stress affects the severity of radiation-induced acute skin reactions in breast cancer patients. European Journal of Cancer Care, 26(6), 1–8. https://doi.org/10.1111/ecc.12737

Williams, F., & Jeanetta, S. C. (2016). Lived experiences of breast cancer survivors after diagnosis, treatment and beyond: Qualitative study. Health Expectations, 19(3), 631–642. https://doi.org/10.1111/hex.12372

Xie, Y., Hu, T., Chen, R., Chang, H., Wang, Q., & Cheng, J. (2023). Predicting acute radiation dermatitis in breast cancer: a prospective cohort study. BMC Cancer, 23(1), 1–13. https://doi.org/10.1186/s12885-023-10821-6

Yadav, B. S., Dahiya, D., & Gupta, M. (2023). Abstract GS5-12: Hypofractionated Radiotherapy in patients with Breast Cancer (HRBC): Acute toxicity data of a phase III randomized study. Cancer Research, 83(5_Supplement), GS5-12-GS5-12. https://doi.org/10.1158/1538-7445.SABCS22-GS5-12

Zhang, V. Y., Takita, C., Wright, J. L., Zhao, W., Reis, I. M., Lee, E., & Hu, J. J. (2023). Abstract 1108: Comparative analysis of hypofractionated and conventional fractionated radiotherapy on acute skin toxicity in a multiracial/ethnic breast cancer population. Cancer Research, 83(7_Supplement), 1108. https://doi.org/10.1158/1538-7445.AM2023-1108