Original paper

The influence of radiotherapy on the quality-of-life assessment of patients with breast cancer

Wpływ radioterapii na ocenę jakości życia pacjentek z nowotworem piersi

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Medical Studies/Studia Medyczne 2022; 38 (3): 205–209
DOI: https://doi.org/10.5114/ms.2022.119919

Key words: quality of life, breast cancer, radiation therapy.

Słowa kluczowe: jakość życia, rak piersi, radioterapia.

Abstract

Introduction: Breast cancer is a disease from which there is a high chance of recovery if it is detected early and proper therapeutic treatment is undertaken. Radiotherapy is one of the methods of local treatment of malignancies, using ionizing radiation. It is often the method of choice among women with breast cancer. Radiotherapy, like other methods of oncological treatment, can cause side effects that may reduce the patients' quality of life.
Aim of the research: The assessment of influence of radiotherapy on the quality of life of patients with breast cancer.
Material and methods: The research method was a diagnostic survey, while the technique was a survey. The research tool was the author's questionnaire. The EORTC QLQ-C30 questionnaire was used to measure the quality of life. The study included 88 women treated at the Oncology Department of the Centre of Oncology of the Lublin Region. The Fisher test and the χ^2 test were used in the statistical analysis.
Results and conclusions: Patients treated with radiotherapy were satisfied with the effects of treatment. There were no differences in the assessment of the quality of life before and after radiotherapy treatment. In the studied group of patients, the overall severity of individual symptoms significantly affects the quality of life of women with breast cancer.

Streszczenie

Wprowadzenie: Radioterapia należy do metod miejscowego leczenia nowotworów złośliwych, wykorzystujących energię promieniowania jonizującego. Często jest metodą z wyboru u kobiet z rakiem piersi. Rak piersi to choroba, która ma duże szanse na wyleczenie pod warunkiem wykrycia odpowiednio wcześnie i podjęcia prawidłowego postępowania terapeutycznego. Radioterapia, podobnie jak inne metody leczenia onkologicznego, może być przyczyną różnych skutków ubocznych, które mogą obniżać jakość życia chorych. Obecnie istnieje wiele metod diagnostycznych, które pozwalają na wczesne wykrycie i ustalenie właściwego rozpoznania.
Cel pracy: Ocena wpływu radioterapii na jakość życia pacjentek z rakiem piersi.
Materiał i metody: Metodą badawczą był sondaż diagnostyczny, natomiast techniką badawczą – ankieta. Narzędziem badawczym był autorski kwestionariusz w formie ankiety. Do pomiaru jakości życia wykorzystano kwestionariusz EORTC QLQ-C30. Badaniami objęto 88 kobiet leczonych na Oddziale Onkologii Centrum Onkologii Ziemi Lubelskiej. W analizie statystycznej zastosowano test Fishera oraz test χ^2.
Wyniki i wnioski: Chore leczone za pomocą radioterapii były zadowolone z efektów. Nie stwierdzono różnic w ocenie poziomu jakości życia przed rozpoczęciem oraz po zakończeniu leczenia za pomocą radioterapii. W grupie chorych ogólnie stopień nasilenia poszczególnych objawów istotnie wpływa na poziom jakości życia kobiet z rakiem piersi.

Introduction

Breast cancer is a serious health and social problem. In Poland, this cancer ranks first in terms of both morbidity and mortality among women [1]. The greatest risk of developing breast cancer occurs in women over 50 years of age [2]. According to forecasts, by 2025 there will be an increase in incidence in all age groups. The risk of death due to breast cancer slightly increases after the age of 50, while in women over 79 years of age, it slightly decreases [1].

Thanks to the existence of preventive programs, increasing social awareness, as well as the progress of

medical technologies, approximately 90% of patients in Poland are diagnosed at the non-advanced stage [3]. Unfortunately, despite treatment, in about 1/3 of patients with early cancer, the disease progresses [4, 5].

The aetiology of the formation of malignant breast neoplasms, despite numerous studies and scientific research, is not fully understood. Cancer can be morphologically induced by several or even over a dozen carcinogenic factors. In about 20–30% of patients, the development of breast cancer may be associated with the so-called risk factors [6]. The group of factors associated with the risk of developing breast cancer includes age, gender, genetic predisposition, prolonged exposure to oestrogens, use of oral contraceptives, hormone replacement therapy, unhealthy lifestyle, and stress. The risk factors listed above do not determine the occurrence of breast cancer. Some of them can be influenced by dietary changes, physical activity, and reduced exposure to stress, and some – such as genetic factors – are not modifiable [7].

Breast cancer is a disease from which there is a high chance of recovery if it is detected early and appropriate therapeutic treatment is undertaken. Currently, there are many diagnostic methods that allow for early detection and proper diagnosis.

One method is breast self-examination. It should be performed every month from the age of 20 years. The best time to do it is from the seventh day to the tenth day after the end of the period because the breasts are less swollen and not so sensitive to touch.

The basic method of imaging diagnostics and the only screening method used in primary cancer prevention is mammography.

In addition to mammography, ultrasound is used in the diagnosis of breast cancer, which involves imaging the breast with the use of ultrasound waves.

An extremely sensitive and accurate examination is magnetic resonance imaging (MRI). After confirming the presence of a lesion in the mammary gland, material for histopathological examination is collected using invasive diagnostic methods. For in-depth diagnostics, fine-needle aspiration biopsy, oligo-biopsy, i.e. core-needle biopsy, or open surgical biopsy is performed.

Based on the performed initial diagnosis, patients with breast cancer are qualified for treatment; the degree of clinical advancement determined according to the TNM scale criterion is taken into account. Each of the individual letters of the TNM scale refers to a different criterion, as follows:

– T (tumour) – the size of the primary tumour (the higher the degree, the more advanced the tumour);
– N (nodes) – the state of regional lymph nodes;
– M (metastases) – the absence or presence of metastases [8].

Treatment of breast cancer is a combined treatment, and the time sequence and order are established according to the accepted and applicable international standards in Poland. The choice of treatment method is based on clinical and pathomorphological assessment, taking into account the histological type and malignancy, expression of ER/PgR, HER2 and Ki67 receptors, the advancement of the lesion in the breast and axillary lymph nodes, the presence or absence of distant metastases of the menopausal state, and the patient's age. The choice of therapy in patients with breast cancer should be made by a multidisciplinary team. The team should include a surgeon, a radiotherapist, a clinical oncologist, a radiologist, a pathologist, a nurse, a dietitian, a social worker, and a psychologist, i.e. representatives of all the specialties caring for the patient. The fundamental task of multidisciplinary teams, apart from improving treatment outcomes assessed by the length of survival, is also to improve the quality of life of the treated patients.

One of the key elements of an effective therapy is precise diagnostics, which is necessary to develop an appropriate treatment strategy. The most common treatment is combined treatment, which combines several treatment methods, such as surgery, systemic treatment (chemotherapy, hormone therapy, targeted therapy, immunotherapy), and radiotherapy.

In the case of early breast cancer, breast conservation therapy (BCT), involving the excision of the tumour followed by radiotherapy, can be performed. It is the recommended method in early (T1-2 (≤ 3 cm) N0-1M0 tumours) invasive breast cancer. Published randomized clinical trials confirm that breast conserving therapy and sentinel node dissection are safe methods of breast cancer treatment [9–12].

However, in the event of contraindications to conserving treatment or as a result of a decision made by patients qualified for amputation, reconstruction is more and more commonly proposed, and the patient undergoes breast amputation (the so-called mastectomy) – complete removal of the breast.

The use of systemic treatment in the preoperative and postoperative period in most patients is based on the sequential use of regimens based on chemotherapy, hormone therapy, and molecularly targeted drugs [13].

Radiotherapy is a method of local treatment that involves the application of ionizing radiation to the area of the diseased breast and lymph nodes. The indications for radiotherapy in the radical treatment of breast cancer are breast-conserving surgery, after breast amputation in all patients with T feature or with metastases in at least 4 axillary lymph nodes, in patients with metastases in 1–3 axillary nodes, especially if they are accompanied by other unfavourable factors (age up to 40 years, HR–, G3 or lymphatic infiltration), in the case of narrow (< 1 mm) surgical margins, and in patients with T3N0 feature and additional risk factors [14, 15].

Radiotherapy as a method of treating breast cancer has various side effects. The method's effectiveness depends on the precise determination of the anatomi-

cal location and potential routs of tumour spread. Complications after radiotherapy can be divided into early and late.

Early complications occur during or immediately after radiotherapy. These include skin reactions (erythema, dry or wet exfoliation), swelling of the breast tissue, fatigue, nausea and vomiting, and often inflammation of the oesophageal mucosa during irradiation of the nodal fields.

Late radiation reactions appear 6 months after the end of treatment and may cause discomfort for several years. Most often they comprise swelling and impaired movement of the upper limb. Also, permanent changes in the appearance of the breast may occur, with subcutaneous fibrosis of the breast gland, and sometimes asymmetry of the breast is observed. Late complications depend on the size of the fractionated dose and the volume of radiation; they are often irreversible and difficult to treat. Their risk can be estimated by a dose volume histogram when planning radiation therapy [16].

Radiotherapy used in the treatment of breast cancer primarily causes skin radiation reactions, which can be early or late.

Early skin radiation reaction involves such symptoms as redness, manifesting various degrees of severity wet and dry exfoliation. When the epidermis is wet exfoliated, there is serous exudate and epidermal defects up to the dermis. Pigmentation changes and hair loss may be visible.

An example of late radiation reactions visible on the skin are discoloration, fibrosis, atrophy of the dermis, and telangiectasia, commonly known as spider veins or necrosis.

Another serious complication of radiation therapy can be recurrent contact dermatitis, breast soreness, and lymphoedema.

All the above-mentioned complications may have a negative impact on the proper physical, mental, social, and spiritual functioning of patients, and thus reduce their quality of life.

The concept of quality of life is ambiguous and difficult to define, and it is understood differently depending on one's worldview, education, and experience. It changes during the course and treatment of cancer. Contemporary medical procedures should be assessed according to standards that consider all aspects of health and quality of life.

The WHO identifies quality of life with health, part of which is not only the absence of disease but also good physical, mental, and social well-being [17].

Quality of life is also defined as "the functional effect of the disease and its treatment perceived and experienced by the patient" [18].

In sociological terms, it is the degree of satisfaction of the needs that are important for a human being; in the psychological aspect it means psychological well-being [19].

Material and methods

The conducted study used the method of a diagnostic survey and the technique of a survey. The EORTC QLQ-C30 questionnaire was used to measure the quality of life. The EORTC QLQ-C30 questionnaire is used to test the subjective functioning, symptoms, general sense of health, and overall quality of life in cancer patients during oncological treatment. The questions concern the scales of physical functioning, in the roles of life (work), as well as emotional, social, and cognitive functioning. The questionnaire includes symptom scales for fatigue, nausea and vomiting, and pain, and individual questions about dyspnoea, insomnia, loss of appetite, constipation, diarrhoea, and financial difficulties. The last 2 questions relate to overall health assessment and general quality of life assessment.

The research tool was the author's questionnaire. The study included 88 women aged from 30 to 70 years, treated at the Oncology Department of the Centre of Oncology of the Lublin Region. Participation in the study was voluntary. Each of the surveyed women was informed about the purpose and course of the study (the method of filling in the received questionnaires) and asked for informed consent to participate in the study. The respondents were guaranteed anonymity, and they were informed that they had the right to withdraw from participation in the study at any stage of its course.

The study group was characterized based on basic demographic data. The surveyed group was dominated by respondents aged over 61 years (63.2% of the study group) living mainly in urban areas (59.4% of the respondents). The most frequently declared level of education was secondary education (44.3% of the respondents). Most of the respondents lived with their family and had children (82.1% and 89.6%, respectively).

Statistical analysis

The Fisher test and the χ^2 test were used in the statistical analysis. These tests evaluated the prevalence of the examined features in the subgroups of patients (the frequency of answers given in the questionnaire). Differences in the average degree of symptoms depending on the time elapsed since the end of radiotherapy were tested using the Mann-Whitney *U* test (non-parametric test). The determinations were carried out for the confidence interval CI = 95%; therefore, the significant differences were those for which $p < 0.05$.

Results

Statistical analysis did not show any significant influence of sociodemographic and clinical factors on the quality of life of the studied patients.

The results obtained on the EORTC QLQ-C30 scale showed that physical functioning ($p = 0.005$), emotional functioning ($p = 0.003$), social functioning ($p < 0.001$), fatigue ($p < 0.000$), pain ($p = 0.017$), financial consequences of the disease ($p = 0.001$), and the overall assessment of health and quality of life ($p = 0.002$) statistically significantly affect the overall level of quality of life.

The conducted analysis showed that radiotherapy of breast cancer does not significantly affect the overall quality of life. In the study group of patients, the most common radiation during radiotherapy was the mammary gland (52.8%), the mammary gland with regional lymph nodes (4.7%), or the chest itself (2.9%). Patients treated with radiotherapy are satisfied with the effects of the therapy (94.3% of the respondents), and 91.5% of the respondents accept their appearance after treatment.

There were no statistically significant differences in the assessment of the quality of life before and after treatment with radiotherapy in the studied group of patients. In this group of patients, the overall severity of individual symptoms significantly affects the quality of life of women with breast cancer. The most commonly reported radiation-related ailments were hardness and cohesiveness of the irradiated breast (78.3%), pain (75.5%), and tightness at the radiation site (75.5%). Rarely, patients reported skin thinning (62.3%) and lymphoedema of the hand (63.2%).

Statistically significant differences in the severity of symptoms depending on the time elapsed since the end of radiotherapy were observed for skin thinning and lymphoedema of the breast.

Conclusions

Traditional methods of therapy are used to treat breast cancer. One of them is radiotherapy, which, like other treatments, entails several side effects.

This was the reason for examining the impact of radiotherapy on the quality of life of women to understand what problems and limitations they face in their daily functioning. Often the disease itself and the side effects of treatment cause them to be temporarily or permanently excluded from fulfilling social roles and to resign from some forms of activity. No less important, apart from physical ailments, is a group of mental problems in the form of a persistent sense of threat to life and the resulting anxiety. The conducted studies showed lower quality of life assessments for patients with breast cancer in whom radiotherapy was used. These studies allow a better understanding of the likely physical, mental, social, and functional consequences of the various treatments and facilitate the best choice of treatment.

Conflict of interest

The authors declare no conflict of interest.

References

1. Wojciechowska U, Didkowska J. Zachorowania i zgony na nowotwory złośliwe w Polsce. Krajowy Rejestr Nowotworów, Narodowy Instytut Onkologii – Instytut im. Marii Skłodowskiej-Curie- Państwowy Instytut Badawczy. http://onkologia.org.pl/raporty/ [Available at: 11.04.2022].
2. Bińkowska M. Hormonalna terapia a nowotwory. In: Hormonalna terapia zastępcza. Skuba P (ed.). Wydawnictwo Lekarskie PZWL, Warsaw 2012; 348-370.
3. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 2018; 68: 394-424.
4. Didkowska J, Wojciechowska U, Olasek P. Nowotwory złośliwe w Polsce w 2015 roku, Wyd. Centrum Onkologii – Instytut im. Marii Skłodowskiej Curie, Krajowy Rejestr Nowotworów, Warszawa 2017.
5. Cancer Tomorrow. Estimated number of incident cases from 2018 to 2030, breast, females n.d. http://gco.iarc.fr/tomorrow/graphic-bar?type=0&population=900&mode=population&sex=2&cancer=39&age_group=valu e&apc_male=0&apc_female=0 (accessed August 16, 2019).
6. Piątek J, Krauss H, Gaik M. Jakość życia kobiet po amputacji piersi. Przegl Ginekol Położ 2004; 4: 173-177.
7. Jassem J, Krzakowski M, Breast cancer. Oncol Clin Pract 2018; 14: 171-215.
8. Ławicki S, Mroczko B, Szmitkowski M. Markery nowotworowe raka piersi. Postęp Hig Med Dośw 2004: 58: 292-300.
9. Genden EM, Ferlito A, Rinaldo A, Silver CE, Fagan JJ, Suárez C, Langendijk JA, Lefebvre JL, Bradley PJ, Leemans CR, Chen AY, Jose J, Wolf GT. Recent changes in the treatment of patients with advanced laryngeal cancer. Head Neck 2008; 30: 103-110.
10. Krag DN, Anderson SJ, Julian TB, Brown AM, Harlow SP, Costantino JP, Ashikaga T, Weaver DL, Mamounas EP, Jalovec LM, Frazier TG, Noyes RD, Robidoux A, Mc Scarth H, Wolmark N. Sentinel-lymph-node resection compared with conventional axillary-lymph-node dissection in clinically node-negative patients with breast cancer: overall survival findings from the NSABP B-32 randomised phase 3 trial. Lancet Oncol 2010; 11: 927-933.
11. Straver ME, Meijnen P, van Tienhoven G, van de Velde CJH, Mansel RE, Bogaerts J, Demonty G, Duez N, Cataliotti L, Klinkenbijl J, Westenberg HA, van der Mijle H, Hurkmans C, Rutgers EJT. Role of axillary clearance after a tumor-positive sentinel node in the administration of adjuvant therapy in early breast cancer. J Clin Oncol 2010; 28: 731-737.
12. Clarke M, Collins R, Darby S, Davies C, Elphinstone P, Evans V, Godwin J, Gray R, Hicks C, James S, MacKinnon E, McGale P, McHugh T, Peto R, Taylor C, Wang Y. Early Breast Cancer Trialists' Collaborative Group. Effects of radiotherapy and of differences in the extent of surgery for early breast cancer on local recurrence and 15-year survival: an overview of the randomised trials. Lancet 2005; 366: 2087-2106.
13. Kalinowski P, Bojakowska U, Kowalska ME. Epidemiologia i analiza czynników ryzyka raka piersi. W drodze do brzegu życia. Praca zbiorowa. Uniwersytet Medyczny w Białymstoku 2013; 341-349.

14. McGale P, Taylor C, Correa C, Cutter D, Duane F, Ewertz M, Gray R, Mannu G, Peto R, Whelan T, Wang Y, Wang Z, Darby S. EBCTCG (Early Breast Cancer Trialists Collaborative Group). Effect of radiotherapy after mastectomy and axillary surgery on 10-year recurrence and 20-year breast cancer mortality ;meta-analysis of individual patient data for 8135 women in 22 randomised trials. Lancet 2014; 383: 2127-3135.
15. Trybulec A, Georgiew F, Borowiec-Trybulec K. Ocena jakości życia pacjentek leczonych onkologicznie z powodu raka piersi. Health Prom Phys Activ 2019; 4: 14-20.
16. Dziadziuszko R. Postawy radioterapii. In: Kompedium Chirurgii Onkologicznej. Jezierski A, Rutkowski P (eds.). Via Medica, Gdańsk 2014; 383-387.
17. Stanisławek A, Rząca M. Kliniczne podstawy onkologii. In: Standardy, procedury w pielęgniarstwie onkologicznym. Łuczyk M, Szadowska-Szlachetka Z, Ślusarska B (eds). Wydawnictwo Lekarskie PZWL, Warszawa 2017; 22-23.
18. Rizzo JD, Lichtin AE, Woolf SH, Seidenfeld J, Bennett CL, Cella D, Djulbegovic B, Goode MJ, Jakubowski AA, Lee SJ, Miller CB, Rarick MU, Regan DH, Browman GP, Gordon MS, American Society of Clinical Oncology. American Society of Hematology. Use of epoietin with cancer; evidence-based clinical practice guidelines of the American Society of Hematology. J Clin Oncol 2002; 20: 4083-4107.
19. Chrobak M. Ocena jakości życia zależnej od stanu zdrowia. Probl Piel 2009; 17: 124-127.

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