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Literature Review

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Effect of Pre-treatment Education Programs on the Anxiety of Patients Receiving Radiotherapy: An Integrative Literature Review

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Abstract

Background: Stress and anxiety in cancer patients are caused by disease diagnosis, unfamiliar experiences, and therapy-related problems. In addition to the short duration of radiotherapy, receiving and understanding of the information about this treatment could be difficult for patients due to anxiety, fatigue, and mental pressure. Training of cancer patients about radiotherapy (RT) via educational programs could reduce pre-treatment anxiety.

Aim: This systematic review aimed to integrate the information regarding the effects of pre-treatment educational training on the level of anxiety and distress symptoms of cancer patients receiving RT.

Method: This systematic review was conducted to identify the studies comparing different methods of pre-treatment patient education before radiotherapy via searching in MEDLINE, PsycINFO, Web of Science, Clinical Key, ProQuest, Ovid and PubMed databases. Selected studies included clinical reports on the effects of educational interventions on the anxiety of patients receiving radiotherapy. Excluded samples were commentaries and studies without intervention.

Results: In total, we reviewed eight articles assessing the effect of educational interventions before radiotherapy on the anxiety of cancer patients. Educational interventions used in these studies included face-to-face consultation with a radiotherapist, group instructions with routine individual training using visual materials (e.g., brochures, booklets, videotapes, and PowerPoint presentations), group discussions, electronic instructions, written materials, and phone contact with a nurse.

Implications for Practice: According our findings, pre-treatment education could reduce the anxiety of cancer patients before radiotherapy. These educational programs could be performed using written, visual, electronic, or face-to-face instructions. However, considering the condition of cancer patients and their treatment, selection of the appropriate training method requires further investigation through comparing different approaches.

Keywords: Anxiety, Cancer, Educational interventions, Radiotherapy

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Introduction

Radiotherapy (RT) could be performed independently or combined with chemotherapy and surgical operations. This modality is known as an effective treatment for malignant cancers and is inherent to the treatment of almost half of cancer patients (1, 2). Preparation for RT could cause substantial stress in the patients and their families. In addition to the concerns regarding the disease diagnosis and unfamiliar experiences, therapy-related issues may increase the stress and anxiety of cancer patients (3).

RT is considered a major cause of stress in cancer patients, especially during the first session, due to factors such as tumor diagnosis, lack of insight into the diagnosis, lack of knowledge about the treatment setting and instruments, invisibility of the treatment, long waiting hours before treatment, uncomfortable positioning, lack of company during the treatment, misunderstanding of the process, and possible side effects. As such, anxiety about radiation therapy is the most significant stressor for cancer patients (1, 2).

According to the study by Malkate et al. (2012), pre-treatment anxiety is mainly due to the inadequate knowledge of the patients regarding the process, methods, and side effects of the treatment. In another study, Moose et al. (2001) claimed that anxiety during the first session of RT treatment is mainly caused by mental pressure and environmental factors, such as the conditions of the waiting lounge and linear accelerator room (4). Although this anxiety decreases throughout the process of treatment, the first RT session is exceptionally frustrating for the patients. Inadequate knowledge about RT may result in the misinterpretation of the intensity of the treatment side effects. Pre-treatment anxiety may disrupt the routine life of the patients and adversely affect their quality of life. High levels of anxiety and therapy-related tension highlight the need for the administration of effective pre-treatment patient preparation programs (3, 5).

According to the literature, sufficient information must be provided for patients receiving RT during the first treatment session. For instance, the results of a study on patients receiving RT in Canada indicated that 83% of these patients preferred obtaining related information before the first session of treatment (6). Furthermore, Cox et al. (2007) reported that 94% of cancer patients were willing to obtain complete information regarding their disease and treatment procedure (7).

Information support services are vital for treatment modalities such as RT since these procedures are rather complicated. Nevertheless, previous studies have indicated that most patients are not satisfied with the amount of information they receive as part of a treatment preparation program. Healthcare providers may overestimate the ability of the patients to understand treatment-related information, while they may underestimate the tendency of patients to receive such information. Considering the unfamiliarity of RT, some patients may confuse this modality with chemotherapy and therefore, hold a negative perception towards the associated side effects. Moreover, most patients tend to lose their temper before the treatment, which further emphasizes the need for pre-treatment patient preparation programs (8).

Although goal-oriented information support services are essential to the effective treatment of patients, particularly those undergoing RT, there are numerous obstacles against the implementation of pre-treatment training programs. Today, cancer treatment procedures, especially RT, are performed at outpatient centers, and most of cancer patients have to manage the disease symptoms and treatment side effects at home in order to improve their performance and quality of life. RT is a short-term treatment, and the majority of the candidates have difficulty in receiving, memorizing, and understanding of the related information due to factors such as anxiety, fatigue, and mental pressure. This is a major challenge against creating opportunities to interact with these patients and offer the required training (9, 10).

Considering the aforementioned obstacles, implementation of effective educational programs and provision of adequate information about RT are likely to reduce the anxiety of cancer patients (11).

Several studies have investigated the effects of supportive training programs before the first session of RT on different variables, such as patient knowledge, satisfaction, and quality of life proposing various results. For instance, some studies have reported that multimedia methods have no significant effect on the anxiety level of these patients despite their high satisfaction rate with the intervention. On the other hand, some researchers have noted no significant difference between written and multimedia training methods in terms of pre-treatment anxiety in cancer patients (12, 13)

In the literature, there are conflicting views regarding the most appropriate training program for disseminating information to patients, especially those receiving RT where there is limited interaction between the patients and medical personnel due to the outpatient nature and short duration of the treatment. Therefore, devising an effective educational program for these patients seems necessary.
This systematic review aimed to integrate the information regarding the effects of pre-treatment educational training on the level of anxiety and distress symptoms of cancer patients receiving RT.

Methods

In this study, we adopted a systematic approach to search for articles comparing different methods of patient education before RT in the medical and psychological literature (Figure 1). Targeted articles were published in English during 2000-February 2016. Literature search was conducted in MEDLINE, PsycINFO, Web of Science, Clinical Key, ProQuest, Ovid and PubMed databases using the following keywords:

1. RT, radiation therapy, and cancer treatment
2. Anxiety, anxious, distress, and psychological symptoms
3. Patient education, educational methods, media, multimedia, video, audio, CD or DVD, interactive or computer-assisted instruction, written materials, pamphlet, verbal, and counseling

Keywords in categories 1, 2, and 3 were limited to human studies published in English language.
Inclusion criteria of this study were as follows: 1) publication in English language; 2) articles evaluating training strategies and education for cancer patients receiving RT; 3) studies comparing educational interventions with standard care procedures (control) or other training programs; 4) articles evaluating the anxiety caused by RT treatment and 5) studies has been performed intervention and evaluation before RT treatment.
The primary search yielded 1,502 non-redundant articles from the selected electronic databases. Two of the researchers independently reviewed the titles of all the articles in order to eliminate the studies that were not empirical or peer-reviewed. At this stage, 1,462 articles were excluded, all of which had been separately rejected by both reviewers. In total, 40 articles were selected. Afterwards, two of the researchers independently reviewed the abstracts of the remaining articles in order to identify and eliminate the studies that did not involve pre-treatment RT educational interventions and anxiety measurement. At this stage, 21 articles were excluded, and 19 articles remained for further examination. The research team cooperated to develop and refine a data abstraction form as a means of conducting a full article review.
In the next stage, we reviewed the references of the remaining articles (n=19), resulted in only three related titles to the subject of the present study. These studies extracted during the primary search, so excluded from the final review.
Methods of literature search used in this review are shown in Figure 1.
To evaluate each article, we used the PRISMA criteria in order to complete data abstraction. The data abstraction form consisted of information such as the name of the author(s), title of article, affiliated journal, publication date, research question, study design, sample selection, and evaluation of the study outcomes.
Out of the 19 remaining articles that were fully reviewed, three studies had used non-educational interventions in the form of consultation, cognitive-behavioral therapy, and socio-psychological therapy. In the other three articles, the evaluated anxiety was associated with the disease, and the treatment stage where the intervention was administered had not been specified. Moreover, one of these studies had been conducted on a sample population of children, and three other cases had investigated cancer patients in general without the particular assessment of patients receiving RT treatment. Also, two of the remaining studies were cross-sectional evaluating the effects of healthcare training. Finally, eight articles that met the inclusion criteria of this study were selected for further analysis. A brief overview of the selected articles is presented in Table 1.

Table 1. Overview of selected articles

Authors	Title	Year of Study	Study Setting	Study Objective	Type of Study	Number of Samples/Specifications of Patients	Comparison Groups	Type of Intervention	Results	Questionnaires
D' haese, S. Vinh-Hung, V. Bijdekerke, P. Spinnoy, M. Beukeleer, M. Lochie, N. Roover, P. Storme, G.	Effect of the timing of the provision of information the anxiety and satisfaction of cancer patients receiving RT	2000		To evaluate the effect of the timing of providing written information the anxiety and satisfaction of cancer patients receiving RT	Clinical trial	68 patients received treatment for breast, lung, head and neck, and pelvic cancer	Simultaneous-information group and stepwise-information group	Two sources of information were used: 1) a booklet with a description of RT procedures and the feelings experienced by patients; 2) teaching sheets with treatment-site-related information/ 68 patients were randomly divided into groups of simultaneous-information (n=31) and stepwise-information (n=37)/ Assessments were recorded before the simulation procedure and during the second and last weeks of treatment.	Anxiety level of stepwise-information group was significantly lower before simulation (P=0.02), and satisfaction level was higher in this group (P=0.001)/ Only the support variable was associated with high anxiety levels (P<0.0001).	State-Trait Anxiety Inventory (STAI)
Dunn, J. Steginga, S. K. Rose, P. Scott, J. Allison, R.	Evaluation of patient education materials about radiation therapy	2003	Division of oncology, Royal Brisbane Hospital, Brisbane, Qld 4029, Australia	To evaluate the effect of a patient education video about radiation therapy on the psychological distress of patients	Quasi-experimental, longitudinal, pre-test post-test design with follow-up	92 newly diagnosed patients, 66 breast cancer patients, and 26 patients with head and neck cancer referred for radiation therapy to Mater Clinic with no history of cancer or radiation therapy	Control group received routine patient information and support/Presentation for planning using printed booklets about radiation therapy and verbal instructions on the treatment provided during the initial consultation with a radiation	Intervention group received a copy of the new patient education video in addition to routine patient information and support/Patients were instructed to watch the video at home before they were presented for planning/Participants were assessed at three time points during specified clinical visits/First, the pre-test assessment was performed after the first consultation meeting with a radiation oncologist. Afterwards, the post-test assessment was performed at the first visiting session for planning (before the	No significant differences observed between the control and intervention groups in any of the outcome variables/ Patients in the intervention group reported high levels of satisfaction with the video and reported that they would recommend the Video to other patients preparing for radiation. Therapy.	Psychological distress subscale of the Psychosocial Adjustment to Illness Scale Self-report (PAIS-SR)

							oncologist	actual planning). After that, the follow-up assessment was carried out upon the completion of the radiation therapy course.		
G. K. B. Halkett, M. O'Connor, S. Aranda, M. Jefford, T. Shaw, D. York, N. Spry, M. Taylor & P. Schofield	A pilot randomized controlled trial of a radiation therapist-led educational intervention for breast cancer patients prior to commencing RT	2013		To determine whether psycho-educational intervention by a radiation therapist for breast cancer patients prior to RT is effective in reducing RT-related concerns, patient anxiety, and depression	Pilot randomized controlled trial	122 patients with breast cancer scheduled for external beam RT referred for the study at least one week prior to radiation planning.	Control group received routine education as verbal and written information.	Intervention group received two face-to-face consultations with a radiation therapist (one prior to radiation Planning, and the other prior to treatment)/Patients completed surveys at baseline, prior to treatment planning, and on the first Day of treatment.	After the first consultation, patient anxiety was significantly lower in the intervention group (P=0.048), as were the concerns regarding RT (P=0.001).	Hospital Anxiety and Depression Scale (HADS)
Häggmark C, Bohman L, Ilmoni-Brandt K, Näslund I, Sjödén PO, Nilsson B.	Effect of information supply on the satisfaction with information and quality of life in cancer patients receiving curative radiation therapy	2001	Karolinska Hospital, Stockholm, Sweden	To evaluate the efficacy of various information inputs	Randomized controlled trial	210 cancer patients (breast, bladder, and prostate) randomly assigned to one of the three informational conditions before receiving RT for the first time.	Comparison between three groups	Patients were randomly divided into one of the three informational conditions: 1) standard information plus group and repeated individual information (n=70); 2) standard information plus one brochure (n=70); 3) standard information only (n=70)/HADS questionnaires were completed by patients at baseline and one hour before the start of RT treatment.	No significant difference between the three groups in terms of anxiety	HADS

Harpreet Kaur, Pragya Pathak, Sukhpal Kaur, & F.D. Patel	Effect of an orientation program on the anxiety level of patients undergoing RT for the first time	2014	Nehru hospital, PGIMER, Chandigarh, India	To investigate the effect of an orientation program on the anxiety level of patients undergoing RT for the first time	Randomized controlled trial	100 patients above18 years of age undergoing RT for the first time	Control group received routine care	Information was provided using visual aids (e.g., booklets and PowerPoint slides)/Patients were received individually for 30-35 minutes/After the orientation program, a 12-page booklet was provided for each patient in the intervention group for self-study/Orientation program was used as part of the intervention before undergoing RT.	A significant reduction in the anxiety of both groups after receiving RT (mostly in the intervention group)	Anxiety measured using the Anxiety Assessment Scale developed by The researcher and validated by experts from the department of RT and nursing
Siekkinen M, Pyrhönen S, Ryhänen A, Vahlberg T, Leino-Kilpi H.	Psychosocial outcomes of e-feedback of radiotherapy for breast cancer patients: a randomized controlled trial	2015	A university hospital in Finland	To test the effectiveness on psychosocial outcomes of electronic feedback knowledge of radiotherapy intervention (e-Re-Know) for breast cancer patients	Randomized controlled trial	Breast cancer patients (n= 126) receiving RT randomly assigned to two groups	Control group received standard education in the form of written materials and face-to-face interaction	Intervention group received e-Re-Know and standard education/E-Re-Know intervention consisted of e-feedback after completing the knowledge test sent by e-mail/Instruments were completed before commencing the first session of RT (M1), after the last session of RT (M2), and three months after the last session of RT (M3).	E-Re-Know positively affected psychosocial outcomes	State anxiety scale of the State-Trait Anxiety Inventory (STAI)
Zissiadis Y, Harper E, Kearney E.	Impact of intensive written information on patients receiving radical radiation therapy: Results of a prospective randomized phase III trial	2010	Salvado Rd, Wembley.W A, Australia	To determine the impact of intensive written information the anxiety levels of patients	Randomized controlled trial	194 patients with pathological diagnosis of cancer receiving radical RT	Control group did not receive more intensive information at the initial consultation with the radiation oncologist	Intervention group received more intensive information (i.e., written information and a telephone call from the research nurse)/ Study questionnaires measuring anxiety (STAI) were completed prior to the first consultation of patients (baseline), at the time of simulation (pre-RT), and after the completion of RT.	No significant difference in the mean score of STAI in any time intervals between the two information groups.	STAI

Harrison R, Dey P, Slevin NJ, Eardley A, Gibbs A, Cowan R, Logue JP, Leidecker V, & Hopwood P.	Randomized controlled trial to assess the effectiveness of a videotape about radiotherapy	2000	The Christie NHS Foundation Trust, Wilmslow Road, Manchester	To assess the effectiveness of a videotape about RT	Randomized controlled trial	247 patients with head and neck, bladder, and prostate cancer	Control group received education in the form of written materials (leaflets)	All patients received a booklet including information on planning and treatment plus a question and answer section about common concerns/A tumor-specific leaflet was provided on treatment side effects/Patients allocated to the intervention group also received a videotape including information on planning and treatment, interviews with treated patients about their experiences, and interviews with clinicians about treatment side effects.	Patients receiving written information alone were significantly less concerned about hair loss compared to those receiving an additional videotape.

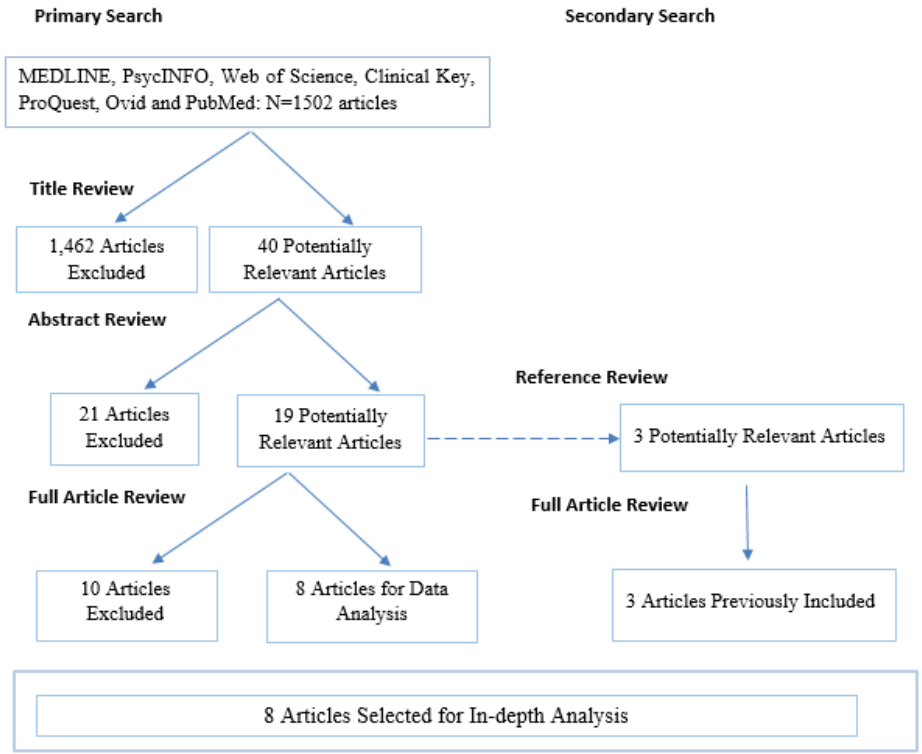

Figure 1: Article Search and Review Process

Results

In this study, we systematically reviewed eight articles investigating the effect of educational interventions before RT on the anxiety levels of cancer patients. A brief overview of the studied articles is presented in Table 1.

In the study by D'haese et al. (2000), 68 patients diagnosed with breast, head and neck, lung, and pelvic cancer who were candidate for radiation therapy were evaluated and compared. Instructions were provided in a stepwise pattern in one group, and a simultaneous method was adopted in the other group using booklets and teaching sheets. Moreover, the Memorial Anxiety Scale for Prostate Cancer (MAX-PC) was completed before simulation and during the second and last week of the RT treatment. According to their findings, use of the stepwise information support method reduced the pre-treatment anxiety of the patients compared to the simultaneous group (14).

In another study, Dunn et al. (2004) assessed 92 patients diagnosed with head and neck and breast cancer in order to investigate the effect of video training on the anxiety levels of these patients before RT sessions. Instructions were provided using 25-minute video clips in the intervention group and via verbal instructions by an oncologist and booklets in the control group. Level of anxiety was measured using the Psychosocial Adjustment to Illness Scale Self-report (PAIS-SR) during the three stages of the first consultation, before treatment planning, and after the treatment. According to the obtained results, there was no significant difference between the groups in terms of pre-treatment anxiety levels (15).

In the research by Halkett et al. (2013), the intervention group received two face-to-face training sessions with a radiotherapist, while the control group was provided with routine training in the form of verbal and written instructions. Anxiety levels were measured using the Hospital Anxiety and Depression Scale (HADS) at the beginning of the intervention, before planning, and on the first day of the treatment. According to the findings, anxiety levels decreased in both groups after the intervention; however, the reduction was more significant in the intervention group (16).

In another study, Haggmark et al. (2001) compared pre-treatment anxiety levels between three groups. The first group received individual and group instructions or via phone calls for six hours during a maximum of one week. The second group was provided with standard information and one brochure, while the third group was enrolled in a group meeting with a physician followed by an invitation for a one-hour group meeting with a nurse. Initially, study samples completed the HADS one hour before the beginning of the treatment. The findings indicated that all the three intervention methods reduced the anxiety level of the patients, while no significant difference was observed between the groups in terms of the overall pre-treatment anxiety (17).

In the research by Zissidias et al. (2010), training sessions were held for the intervention group in the form of written instructions and phone calls from a nurse, while the control group only received consultation from an oncologist. Participants completed the State-Trait Anxiety Inventory (STAI) after consultation with the oncologist, before simulation, and after the treatment. The results were indicative of no significant difference between the two groups in each of the measurement time points (18).

In this regard, Harrison et al. (2001) conducted a study on 247 patients diagnosed with head and neck, bladder, and prostate cancer referred for RT in order to evaluate the effectiveness of videotapes in reducing the anxiety of these patients. Both intervention and control groups received written instructions (leaflets), while the intervention group also participated in training sessions with videotape. Anxiety levels were measured before randomization and immediately before the beginning of the treatment. According to the findings, RT-related and hair loss anxiety decreased in the group who received written instructions (19).

In another study, Kaur et al. (2014) used audio-visual materials in the intervention group, while the control group only received routine care. The anxiety level was measured using a researcher-made questionnaire. According to the obtained results, anxiety declined in both groups after the instructions; however, the reduction was not statistically significant in the intervention group (20).

In their research, Siekkinen et al. (2015) evaluated the effect of education via e-mail on the anxiety level of breast cancer patients. The study was conducted on 126 patients diagnosed with breast cancer, and the control group received verbal and written instructions. Furthermore, the STAI was completed before the first RT session, after the treatment, and three months after the last treatment session. The

results indicated that the patients in the electronic training group demonstrated lower anxiety levels in all three measurements (21).

Overall, in four studies, the anxiety levels were observed to decrease in both groups, while patients in the intervention group were found to experience lower anxiety levels compared to the control group (16, 17, 20, and 21). On the other hand, in three studies, differences in the mean scores of anxiety were not significant between the intervention and control groups (15, 17, 18), and only in one study, the control group who had received written instructions had lower anxiety levels (19).

Discussion

In the present literature review, we aimed to investigate the studies performed to assess the effects of different training programs used for the preparation of cancer patients before RT treatment.

According to our findings, all the reviewed studies were conducted in healthcare centers on patients diagnosed with breast (14-17, 21), prostate and bladder (16, 19), head and neck (14, 15, 19), lung, and pelvic (14) cancer. It is noteworthy that in one study, the exact diagnosis of the patients was not specified (20).

Based on the findings of the reviewed studies, anxiety occurs at a wide range of levels in patients with different types of cancer. In one study, Zabora et al. claimed that the anxiety level of patients with head and neck cancer was higher compared to patients with breast, colon, and gynecologic cancers (22).

Patients experience different levels of anxiety due to the particular side effects associated with the treatment of different body parts. Such examples are alopecia, mucositis, loss of appetite, and insomnia (head and neck RT), eating disorders (abdominal treatment), and dermal lesions in breast cancer. Furthermore, cancer patients have different levels of disease apprehension and life expectancy. It appears that conducting interventional and comparative studies on patients with similar diagnoses, identical treatments, and possible side effects could bear realistic results regarding the efficacy of educational programs in the reduction of anxiety. As such, the effects of confounding variables could be eliminated.

Educational interventions in the present review included face-to-face consultation with a radiotherapist (16), group instructions with routine and individual training using visual materials (e.g., brochures and booklets) (14, 20), PowerPoint presentations (20), group instructions (17), videotapes (15, 19), electronic instructions (21), written materials, and telephone contact with a nurse (18). According to the results of the present review, patient literacy is one of the most important criteria for enrollment in studies in which the effects of training programs on patients with low literacy is not clearly specified. In educational interventions, use of videotapes has been shown to have several advantages. Such examples are the visual demonstration of treatment processes, practicality for patients with low literacy, provision of more detailed information compared to other methods, step-by-step training mechanism based on the educational needs of patients, possibility for frequent views, and demonstration of animated procedures in order to engage the vision of the patients (13, 23, 24).

In the current review, we identified two studies comparing the effects of using videotapes, face-to-face consultation with a radiotherapist, and written instructions on the anxiety levels of patients. According to the findings, use of videotapes was less effective in reducing the pre-treatment anxiety of patients (15, 19).

In some of the articles reviewed in the present study, the exact time of the intervention was not mentioned, while all the interventions were administered before specifying the treatment program, on the day before the beginning of the treatment (16), and one week before the start of RT (17). Moreover, duration of training in most of the reviewed studies was 25-35 minutes per session (15, 17, 20), while the duration of interventions had not been specified in some of the articles (16).

According to the findings of the reviewed studies, the majority of cancer patients prefer receiving information prior to the recommendation of RT (6, 25). This denotes the importance of observing the exact duration and timing of training sessions in this regard. Moreover, most of these studies provided a complete range of information concerning RT treatment and the associated side effects at the beginning and simultaneous with the interventions. Only in one study, the information was provided via emails and receiving patient feedback for each stage of the intervention. In another study, the information regarding RT treatment was provided in two stages (before treatment and a few sessions after the beginning of the treatment), and the patients were reported to have lower levels of anxiety

compared to the control group who received simultaneous instructions (14, 21). Comparison of the results of the reviewed studies indicated that information flow in the form of stepwise provision and clarity of the details are of paramount importance in decreasing the anxiety level of patients receiving RT.

The educational content in the reviewed studies included general information about RT (14-21), emotional concerns of patients (14, 16, 19), common side effects caused by the treatment and their management (18-21), dietary planning during the RT period (20), self-care, and lifestyle (21). In most of these studies, the control group received routine training, the process of which had been specified in some cases. However, in four studies, common training interventions consisted of verbal instructions, use of written materials (15, 16, 21), and booklets only (19).

According to the results of the present review, use of homogeneous content is highly important in order to compare different educational materials and media (13). However, in most of the studies, comparison of educational media (written or audio-visual) was performed using a routine method (control group), which was different from the intervention group in both nature and content. For instance, routine face-to-face or verbal training by different individuals was commonly accompanied by the provision of written materials already available in healthcare centers, which made it impossible to evaluate the exact intervention method. Therefore, the obtained results could be attributed to the heterogeneous educational contents used for the study groups.

In two of the reviewed studies, patient training was implemented by a radiologist (16, 21), and in two other studies, a nurse was responsible for the educational intervention (17, 18). In one of the studies, patients received instructions from an oncologist (15). As for the other studies, the person in charge of instructions was not specified. In most of the reviewed studies, a radiotherapist and/or an oncologist provided the required educational proceedings and preparation programs, and only in two cases, the educational role of nurses was examined.

In addition to academic courses, nurses have frequent re-educating programs in order to obtain the required skills as a trainer, and this has been specifically defined in the professional duties of these healthcare providers (26). Therefore, increasing the involvement of nursing staff in the training of patients receiving RT seems mandatory. It is also noteworthy that based on the results of the reviewed studies, interventions carried out by a therapist (e.g., oncologist or radiotherapist) (15, 16, 21), as well as the training programs in the control groups, could effectively reduce the anxiety of patients before RT.

In the reviewed articles, the instruments used to measure anxiety included the HADS (16, 17, 19), PAIS-SR (15), STAI (14, 18, 21), and a researcher-made questionnaire (20). Data were collected at the beginning of study (15-18), before the specification of treatment program (16, 18), before the beginning of RT (15, 17, 20, 21), in the first session of RT (16, 19), before the last session of RT (21), immediately after RT (15, 18-20), one and a half months after RT (19), and three months after RT (21). According to the findings of these studies, anxiety before RT was mainly due to the unfamiliarity of the patients with the treatment setting and process. Moreover, the time interval (a few days or a couple of weeks) between the recommendation of RT and completion of the treatment schedule by the oncologist or radiotherapist further increased the anxiety of the patients. As such, most of the patients were reported to experience high levels of anxiety during their first session of RT. Even without instructions, anxiety of patients tends to decline through experiencing the treatment process during the first session (1, 2). Furthermore, during the treatment and after the emergence of the initial side effects, patients may experience a different type of anxiety, in which the attention is drawn from the treatment procedure to its side effects, management of the complications, and prognoses of the disease (19). On that ground, studies that compared patient anxiety at its peak (i.e., prescription of RT) as the baseline measurement and after the intervention (immediately before the start of treatment on the first session) could demonstrate the effectiveness of a certain educational program in decreasing the anxiety level of patients.

In the reviewed studies, most of the training was provided in healthcare centers and only in one study, patients were provided with educational videotapes to watch at home (15). In only one research, the patients were randomized in order to ensure that the educational content had been studied closely (19); however, this had not been specified in other articles. Considering the outpatient treatment and short visits of patients in healthcare centers, as well as the unsettling mental and physical states of the patients, it is rather difficult for the patients to receive, memorize, and understand the provided

information (9, 10). Therefore, use of educational interventions that allow patients to receive information under more favorable circumstances is absolutely necessary.

One of the limitations of the present review was the inaccessibility of certain databases and/or the electronic version of some articles. In addition, restricting the selected studies to the articles published in English language and those of a purely educational nature, unspecified intervention type and measurement time in some of the studies, and the inability to review unpublished articles and/or theses reduced the number of the reviewed articles preventing us from including some other studies in this systematic review.

Implications for Practice

According to the results of this review, provision of pre-treatment education could reduce the anxiety of cancer patients before RT. Training in this regard could be offered in the form of written, visual, electronic, or face-to-face instruction. However, deciding on the appropriate method or medium for educating these patients might be difficult considering the conditions of cancer patients and nature of their treatment. Therefore, it is recommended that further investigation be carried out in order to compare different methods of educational intervention to determine their efficacy in reducing pre-treatment anxiety. Moreover, use of advanced methods, such as videotapes and multimedia instruments, and presence of the main therapist during training could enhance the effectiveness of patient education programs.

According to the findings of the reviewed articles, in the planning of an educational program, it is of paramount importance to consider the general status of patients in terms of literacy, stepwise flow of information, and clarity and transparency of training so as to prevent the increasing anxiety of patients due to the educational interventions. The results of the reviewed studies could contribute to the proper choice of educational programs for potential RT patients from a wide range of literacy, culture, and economic status. In addition to reducing anxiety, such programs must be able to improve the knowledge and awareness of patients regarding all the other aspects of the treatment, including the management of side effects and enhancement of the quality of life.

One of the interesting findings of the current review was that the aforementioned studies neglected the key role of patient caregivers in educational interventions. Presence of the family members and caregivers of patients in training sessions could contribute to the reduction of anxiety through support and eliminating mental pressure. Therefore, it is suggested that future studies focus on the role of family caregivers in the proper implementation of pre-treatment patient educational programs.

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Conflict of interest

The authors declare that there is no conflict of interest.

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