

INTERVENTIONS AIMED TO PREVENT BREAST CANCER BY PROMOTING SELF-EXAMINATION: A SYSTEMATIC REVIEW OF LITERATURE

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Abstract: *Early detection of breast cancer plays an essential role in reducing morbidity and mortality caused by the disease. This review is intended to summarize and outline the outcomes obtained as a result of the educational interventions focused on promoting breast cancer prevention by developing and effectively employing the ability involving breast self-examination procedure; these interventions are addressed by a series of studies centered on an individual randomization of participants and at least one control group. With that end in view, we carried out a systematic search in the PubMed and PsycInfo databases and we found 21 eligible studies which involved 5754 women. Most of these studies reported increases in breast self-examination frequency after the subjects' participation in interventions. Therefore, the conclusion of this review is that educational interventions may result in adopting new and efficient breast cancer prevention behaviors such as breast self-examination, which is an undeniable argument to increase the level of dissemination of such interventions among women.*

Key words: *prevention; breast cancer; breast self-examination; BSE, review;*

Introduction

Cancer is a serious illness, which, when remains untreated, poses a major threat to anyone's life. According to data available on the World Health Organization (WHO) website (April 2020), cancer is one of the leading causes of death worldwide; furthermore, the scientists estimated that in 2018, over 9.6 million deaths were caused by this terrible illness. At the individual level, the studies showed that over the course of the illness trajectory, the individuals who were positively diagnosed as well as their families dealt with major consequences at the physical level (Cieślak, 2013; Glajchen, 2012), the mental level (Ștefănuț, & Vintilă, 2019a; Ștefănuț, & Vintilă, 2019b; Stefanut & Vintila, 2020; Vahidi et al., 2016) as well as at the spiritual levels (Cieślak, 2013). The burden brought by this disease can be reduced by taking into account the WHO recommendations.

According to this organization, many cancers have a high chance of being cured if they are detected at an early stage and treated properly. Therefore, a special attention has been paid in the specialty literature in relation to the development of cancer prevention programs and health education.

The ultimate and utmost purpose of health education lies not only in changing those behaviors that are supposed to be harmful to health but also in adopting certain behaviors that promote health (Simonds, 1976) at the individual or group level or at the level of wider communities (Gavrila-Ardelean, 2019). Health promotion behaviors may take into account: (1) primary prevention aiming at avoiding the onset of the disease; (2) secondary prevention aimed at detecting the disease in its early stages; (3) tertiary prevention aimed at rehabilitating the subject who dealt with and experienced a serious illness (WHO). Researchers managed to identify several levels at which health education may be effectively implemented and may significantly influence people's health behaviors: (1) the cognitive level; (2) the interpersonal level; (3) the institutional level; (4) the community level and (5) the public policy level (McLeroy, Bibeau, Steckler, & Glanz, 1988). Health education reflects a fusion of approaches, methods and strategies taken from the social and medical sciences and consequently, it is based on theoretical and practical perspectives, which, in their turn, all are based on psychology, sociology, communication, care (nursing), economics and marketing (Glanz, Rimer & Viswanath, 2008, Gavrila-Ardelean & Gavrila-Ardelean, 2016). Psychological communication helps improve affectivity which is of highest necessity in order to achieve mental balance in this difficult process (Goian, 2019). Also, social workers are involved in this process, who have the skills to deal with individuals and families in this situation and who are also used to a professional language for this area (Goian, 2004, Goian, 2010, Gavrila-Ardelean, & Gavrila-Ardelean, 2017).

One of the most important areas of applicability of health education is cancer prevention education. Given the context of different types of cancer, breast cancer (BC) is the second most common type worldwide, with 2.09 million cases (WHO). In Romania, this type of cancer is ranked on the third place in terms of incidence (11.5%) with a mortality of 6.6%. Thus, early detection of BC advocated by health education may play a significant role in reducing morbidity and mortality as a wider range of treatment options are available in the early stages of the disease and the survival rate may significantly increase as a result of early diagnosis (Bener et al., 2009). Early detection of BC may be obtained by using the following screening methods: breast self-examination (BSE), clinical breast examination (CBE) and mammography (Rosmawati, 2010). Even if using BSE as the exclusive method of BSE early detection is not appropriate, the American Cancer Society recommends it as an option for women as young as 20 years old. Unlike CBE and mammography, BSE does not require a visit to the doctor or any other special expertise, it is cheap, simple, non-invasive and can be done at home. According to the recommendations made by the American Cancer Society, women should know how they feel and how their breasts look like, so that when feeling something

unusual during the self-examination procedure, they will be able to promptly report such changes to the specialist physician.

As a result of the aspects outlined above, the experts developed and implemented not only certain interventions intended to support patients and their families in their efforts and struggles to cope with the disease (Vintilă, Ștefănuț, & Sârbescu, 2019) but also several educational interventions whose purpose was focused on breast cancer prevention by promoting the BSE. As far as the authors are aware of, until the date of publication of this paper, there was a systematic review of the specialized literature (Janz, Becker, Anderson, & Marcoux, 1990) that analyzed the BSE interventions, but no other similar research was conducted lately. Therefore, this study aims to summarize the outcomes obtained as a result of the interventions that have taken into account the BSE.

Methodology

Research methods used to identify the eligible studies

We managed to get possession of a series of articles and papers relevant for the subject we have hereby underlined following a systematic research we have carried out in the PubMed and PsycInfo databases. To that effect, we have used the following search algorithm: "breast self examination" AND (intervention OR program). Its application at the level of abstracts helped us, at the same time, to acquire a wider and specifically-oriented base of selection. The search algorithm included no time limit and this fact allowed us to consider both recent and older researches.

Inclusion and exclusion criteria

In order to be considered eligible, the studies had to include female subjects of at least 18 years of age and who had not been previously diagnosed with cancer.

Another requirement was that the studies should consider only researches based on an experimental pattern, i.e. only those studies for which there was an individual random distribution in groups, for which there was a control group and which included interventions aimed at increasing the BSE frequency intended to prevent breast cancer occurrence. Furthermore, again, for eligibility purposes, the studies had to document valuable data related to BSE.

Selection process

We managed to identify a number of 456 studies thanks to the research algorithm we have applied to the aforementioned databases. However, of all 456 studies, 53 were found to be duplicates and consequently they have been removed and the remaining 403 studies were analyzed at the abstract level. By applying the inclusion and exclusion criteria, we removed another 306 studies because: 180 of them did not meet the design criteria, 99 provided no BSE information, 8 did not address the breast cancer prevention aspects, 10 did not meet the inclusion criteria regarding the participants, 3 were not published in English and no abstracts were

available for the last 6 studies. Therefore, during the next stage, i.e. the analysis conducted at the level of the entire text, we focused on the remaining 97 studies. Of these, 68 had a distinct design which was completely different than the one which was of interest for this research, 4 did not provide BSE data and 4 were not available. After this last selection, 21 studies were found to be eligible and ready to be included in the final analysis. The selection process is shown in the PRISMA diagram outlined as *Figure 1*.

Data extraction

Using the following standard, we managed to pull out relevant data from all eligible studies we have included in our analysis: country where the study has been carried out, number of participants, their average age, type of intervention that has been conducted (face-to-face, text message, multimedia), number of the intervention sessions and their cumulative length, intervention description, all educational methods that have been employed and last but not least, all major outcomes that have been obtained.

Results

Characteristics of all participants in the studies

The final analysis included 21 studies which involved 5745 subjects. The number of participants fluctuated from 37 (Visser, Bos, Prins, Hoogerbrugge, & van Laarhoven, 2015) and 899 (McLendon, Fulk, & Starnes, 1982), giving thus an average of 274. The subjects' average age was 38,16 years, with a minimum threshold of 18.78 years documented in the studies signed by Craun, & Deffenbacher, 1987 and a maximum threshold of 53.75 years, reported by Lindberg, Stevens, Smith, Glasgow, & Toobert, 2009). 52% of the aforementioned studies were carried out in USA (Audrain et al., 1999; Bodurtha et al. 2009; Champion, & Scott, 1993; Craun, & Deffenbacher, 1987; Fitzgibbon, Gapstur, & Knight, 2003; Grady, Goodenow, & Borkin, 1988; Lauver, 1989; Lindberg et al., 2009; McLendon et al., 1982; Mishra et al., 1998; Reis, Trockel, King, & Remmert, 2004). The second country which documented 14% of the number of studies was Iran (Hajian, Vakilian, Najabadi, Hosseini, & Mirzaei, 2011; Naserian, Ansari, & Abedi, 2018; Savabi-Esfahani, Taleghani, Noroozi, & Tabatabaeian, 2017), while Turkey reported 9% (Secginli, & Nahcivan, 2011; Tuzcu, Bahar, & Gözümlü, 2016). Australia (Janda, Stanek, Newman, Obermair, & Trimmel, 2002), Jordan (Alsaraireh, & Darawad, 2019), Malaesia (Akhtari-Zavare et al., 2016), the Netherlands (Visser et al., 2015), UK (Prestwich et al., 2005) carried out one similar research, representing this 5% of all studies subject to our analysis.

Main characteristics of studies

The major purpose and scope of all papers considered for our final analysis was the promotion of BSE as a way of preventing breast cancer. 62% of the studies subject to this review have based their interventions on different theories.

Therefore, the Health Belief Model has been used in seven studies (Akhtari-Zavare et al., 2016; Bodurtha et al., 2009; Champion, & Scott, 1993; Craun, & Deffenbacher, 1987; Hajian et al., 2011; Secginli, & Nahcivan, 2011; Tuzcu et al., 2016), while other two studies employed the Self-Regulation Theory (Lauver, 1989; Prestwich et al., 2005). Cognitive-Behavioral Theory, Self-Efficacy Theory, Behavioral Theory and Theory of Planned Behavior were the basis for a study authored by Audrain et al. (1999), Mishra et al. (1998), Grady et al. (1988) and Janda et al. (2002).

A major part of these studies (85%) involved interventions conducted face to face (Alsaraireh, & Darawad, 2019; Akhtari-Zavare et al., 2016; Audrain et al., 1999; Bodurtha et al., 2009; Champion, & Scott, 1993; Craun, & Deffenbacher, 1987; Fitzgibbon et al., 2003; Grady et al., 1988; Hajian et al., 2011; Lauver, 1989; Lindberg et al., 2009; McLendon et al., 1982; Mishra et al., 1998; Prestwich et al., 2005; Savabi-Esfahani et al., 2017; Secginli, & Nahcivan, 2011; Tuzcu et al., 2016; Visser et al., 2015). The remaining studies reported the following as methods of delivering the intervention: text message (Naserian et al., 2018), video recording (Janda et al., 2002) and CD-ROM (Reis et al., 2004). Ten of the interventions were conducted in groups (Alsaraireh, & Darawad, 2019; Akhtari-Zavare et al., 2016; Craun, & Deffenbacher, 1987; Fitzgibbon et al., 2003; Hajian et al., 2011; Janda et al., 2002; Mishra, et al., 1998; Prestwich et al., 2005; Savabi-Esfahani et al., 2017; Tuzcu et al., 2016), and the other ten were conducted individually (Audrain et al., 1999; Bodurtha et al., 2009; Champion, & Scott, 1993; Grady et al., 1988; Lauver, 1989; Lindberg et al., 2009; McLendon et al., 1982; Naserian et al., 2018; Reis et al., 2004; Visser et al., 2015). There was also a study involving an intervention which consisted in two parts: one part was done in a group and another part was carried out individually (Secginli, & Nahcivan, 2011).

The number of contacts for interventions ranged from 1 (Alsaraireh, & Darawad, 2019; Audrain et al., 1999; Bodurtha et al., 2009; Champion, & Scott, 1993; Craun, & Deffenbacher, 1987; Grady et al., 1988; Hajian and al., 2011; Janda et al., 2002; Lauver, 1989; Lindberg et al., 2009; McLendon et al., 1982; Prestwich et al., 2005; Savabi-Esfahani et al., 2017; Secginli, & Nahcivan, 2011; Tuzcu et al., 2016; Visser et al., 2015) and 16 (Fitzgibbon et al., 2003) with an average of 2. For the studies that provided information regarding the length of interventions, the average cumulative duration was 1.8h with a minimum intervention time of 0.15h (Lauver, 1989) and a maximum length of 8h (Mishra et al., 1998).

The interventions employed different educational methods, such as: presentation, guided exploration, question & answer sessions, practical demonstration, exercising the BSE by the participants, role playing, video watching. The educational materials included in these sessions were also varied: power point presentations, video clips, pamphlets, manuals, various reminders, artificial breast models, graphics, pictures.

Summarizing the results depending on their theoretical substantiation

Results of interventions based on Health Belief Model

Most of the studies that had a theoretical foundation were based on the Health Belief Model. According to this model, where a person believes that he/she is prone to develop a disease with serious consequences and/or where he/she considers that there is available a series of actions intended to decrease the probability of disease occurrence or to diminish its consequences and where the benefits of implementing such actions exceed the possible costs, then he/she is likely to adopt reasonable preventive behaviors. The studies based on this model aimed to educate all participants in relation to both the disease and the prevention thereof as well as to change their beliefs about disease. Most interventions based on the Health Belief Model reported statistically significant improvements in terms of the BSE in the intervention groups compared to the control groups (Akhtari-Zavare et al., 2016; Champion, & Scott, 1993; Craun, & Deffenbacher 1987; Hajian et al., 2011; Secginli, & Nahcivan, 2011; Tuzcu et al., 2016). There is also a study that led to the statistically insignificant increase of BSE in the intervention group compared to the control group (Bodurtha et al., 2009).

Results of interventions based on Self-Regulation Theory

According to this theory, stressful circumstances lead to the onset of a self-regulation process. As it is believed that objective, concrete information promotes coping by making available a scheme of specific and unambiguous elements related to that particular circumstance, the interventions are based on providing such information. One of the studies that used this framework achieved a statistically significant increase in terms of the BSE in the intervention group compared to the control group (Prestwich et al., 2005), while another intervention also showed improvements which, unfortunately are not statistically significant (Lauver, 1989).

Results of interventions based on Cognitive-Behavioral Theory

The research conducted by Audrain et al. (1999) uses the problem-solving training as a support for the intervention. This is a cognitive-behavioral intervention that monitors and outlines the development of coping skills by applying the following steps: defining the problem, generating and evaluating solutions, deciding on the best solution and implementing it. As a consequence of participating in this intervention, the women in the intervention group presented a statistically insignificant increase in BSE frequency compared to those in the control group.

Results of interventions based on Behavioral Theory

According to the behavioral theory, a behavior is either maintained or waived depending on its consequences. Starting from the affirmation that BSE has either negative consequences (if changes are found in breasts) or neutral

consequences (if there are no breast changes), Grady et al. (1988) have substantiated their interventions on the introduction of external rewards or self-rewards. As a result of this research, they found that external rewards are more effective. They also noticed that although self-reward was used by only half the participants, when used it proved to be more efficient than external rewards.

Results of interventions based on Self-Efficacy Theory

According to Bandura's theory of self-efficacy (1977), a subject's perception of self-efficiency with regard to performing a task is enhanced by increasing the expertise in performing that particular task. As a result of the increased self-efficiency, we may also notice the behavior change (in this case the adoption of BSE) and the improvement of the outcome (prevention). The intervention substantiated on this theory and which was included in the study of Mishra, et al. (1998) led to a significant increase in the participants' knowledge, self-efficiency and BSE.

Results of interventions based on Theory of Planned Behavior

According to this theory (Ajzen, & Fishbein, 1980) the BSE-related behavior is highly influenced by the subject's intention to achieve it, by his/her attitude towards such behavior and the subjective standards (what the other relevant persons think about such behavior) and last but not least, by the feeling to control it. This was the substantiation of the intervention carried out by Janda et al. (2002) who found that women in the intervention group performed BSE more frequently than those in the control group.

Summarizing the outcomes that have been obtained depending on their breadth

If we make reference to the effectiveness of the educational interventions that have been performed, we found that most of the studies (57%) reported significantly better results regarding the BSE in the intervention group compared to the control group. Thus, upon the completion of the programs, the participants in the intervention groups described by the following studies documented a significantly higher frequency of BSE than the participants from the control groups: Akhtari-Zavare et al. (2016) (IG: 34.19%; CG: 18.55%), Tuzcu et al. (2016) (IG: 56%; CG: 32.3%), Hajian et al. (2011) (IG: 82%; CG: 62%), Secginli and Nahcivan (2011) (36.1%; CG: 11.8%), Lindberg et al. (2009) (IG: 59%; CG: 12.2%), Reis et al. (2004) (IG: 92.6%; CG: 72%). We also noticed that the averages of the BSE behaviors in the intervention groups are significantly higher than in the control groups in the following studies: Alsarairh and Darawad (2019) (IG: M = 2.59, SD = 0.54; CG: M = 1.27, SD = 0.61), Mishra, et al. (1998) (M = 5; SD = 1.1; CG: M = 1.7; SD = 1.4), Champion and Scott (1993) (IG1: M = 10.54; SD = 3.35; IG2: M = 10.4; SD = 3.1; IG3: M = 11; SD = 2.51; IG4: M = 9.44; SD = 4.05).

Other studies also reported improvements in BSE frequency in the intervention groups as compared to the control groups, but these were not statistically significant (Bodurtha et al., 2009; Audrain et al., 1999; Fitzgibbon et al., 2003; Janda et al., 2002; Lauver, 1989; Savabi-Esfahani et al., 2017; Visser et al., 2015).

There was also a study (Naserian et al., 2018) which, following the intervention, documented a significantly better score that was obtained in the intervention group compared to the control group with regard to CBE, but, unfortunately, it outlined a lower score in the intervention group compared to the control, in terms of the BSE.

A synthesis of the data excerpted from the studies has been outlined in *Table 1*.

Discussions

This review attempted to summarize and analyze the results of randomized interventions that aimed at promoting BSE. Following the systematic searches conducted in the PubMed and PsycInfo databases, we managed to find 21 studies that met the criteria for inclusion in our final analysis. Most of them (57%) reported interventions that led to statistically significant improvements in BSE practice. This outcome is in agreement with the results found by Agide, Sadeghi, Garmaroudi and Tigabu (2018), who show that the interventions have succeeded in increasing the screening for BC in one way or another, but the best results seem to have been obtained by the individual interventions. i.e. by the type of intervention that was in fact targeted by our review.

Most of the researches included in this systematic review (62%) have been based on a certain theoretical model while 54% of them were substantiated by the Health Belief Model. Except for one of these studies based on the Health Belief Model, all others reported statistically significant increases in the BSE. This finding is consistent with those highlighted by Naz, Simbar, Fakari and Ghasemi (2018) who found that three quarters of the studies analyzed in the review they have authored were rooted in the Health Belief Model and most of them obtained significant results regarding the carrying out of BSE, CBE or mammography. We also noticed that the rest of the theoretically substantiated researches included in this analysis documented certain improvements in BSE frequency, but these improvements were statistically significant only for the study based on Bandura's self-efficacy theory. With regards to the studies included in the analysis and which had no specific theoretical basis for the interventions that have been performed, we noted that 50% of them reported statistically significant improvements in terms of the BSE frequency.

Using text messages, video recordings and interactive computer programs are just other ways of delivering interventions that employ contemporary technology. The study that used a computer program to disseminate the intervention obtained statistically significant increases in the frequency of BSE; on the other hand, the studies that used video recordings led to statistically

insignificant improvements in terms of this behavior and the those which used text messages documented a higher frequency of BSE in the control group than in the intervention group. It should be noted that the intervention performed via the computer program also included a component that provided for the practice of breast examination on an artificial model. These outcomes finally lead to the idea that although modern technology may facilitate the transmission of educational messages, it may be necessary that to use other features of the intervention in order to compensate for the lack of direct interaction with subjects.

If we were to refer exclusively to the format of interventions (individual or group interventions), we may notice that seven of ten studies that used group interventions and four of ten studies that used individual interventions documented statistically significant increases in BSE. Also, the study that included an intervention performed in the group but which also integrated the individual guided practice of the BSE reported significant improvements in terms of BSE.

A specific educational method included in the interventions was the practice of breast examination. Eight of eleven studies that reported the use of this method have reported statistically significant increases in BSE frequency. This finding is consistent with the previous findings according to which the use of different educational materials leads to the increase of BSE (Agide et al., 2018).

57% of the studies included in the analysis provided information on the length of the intervention. Two thirds of them had an intervention length of at least one hour, while the remaining 1/3 documented that the intervention lasted between 10-30 minutes. In six of the studies whose interventions lasted at least one hour and in two of the interventions that lasted no more than half an hour, statistically significant increases in BSE frequency were obtained. However, the available data do not allow the hypothesis regarding a relation between the length of the intervention and the final outcomes, but future papers should consider focusing on setting up an optimum number of interventions whose main objectives should be the BSE frequency, as major topic for future analysis.

From the aspects outlined above, we may sum up that educational interventions may result in adopting certain cancer prevention behaviors such as BSE. Following this review, the authors' opinion is that the ideal educational intervention to promote BSE should be based on the Health Belief Model, it should include guided breast examination practice and should also promote the subject's perceived self-efficacy in building up and consolidating this behavior. As has been pointed out in other studies (Kennedy et al., 2016), educational programs on BC screening have a relatively low cost and may report significant health benefits for women.

Nevertheless, this research is accompanied by some limitations. The fact that there were included only researches published in English and which have been subject to a peer-review process is just one of these limitations. Although this method provided a high quality of the studies included in the analysis, it unfortunately excluded numerous dissertations, unpublished studies and conference

proceedings. Thus, the number of reviews that have been analyzed was relatively small. The use of certain rigorous inclusion criteria may have contributed to this small number of researches. Another limitation of this paper may also be the fact that it offers only a qualitative analysis of the studies that have been outlined. Once with increasing the homogeneity of outcomes reporting in the future studies, it will be possible to consider the meta-analytical analysis. The fact that this review considered eligible solely the individual interventions and not the community-based interventions may also be a limitation, but the analysis of the latter interventions may be subject to other future studies. Because most of the studies were conducted in the USA, the generality these outcomes may be reduced, which may also be regarded as a limitation of this review. The future studies may also aim to diversify the delivery of interventions as well as to analyze which are the most effective educational methods which may be implemented in order to increase the BSE frequency.

Conclusions

Most of the educational interventions that have been analyzed documented significant results in promoting BSE as a breast cancer screening strategy. The outcomes highlighted herein stand for a robust argument in terms of increasing the level of dissemination of such interventions among women in order to promote the prevention of this type of cancer.

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