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Review Article

Breast Cancer: A Review on Quality of Life, Body Image and Environmental Sustainability

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Abstract: Breast cancer is the most prevalent cancer in women worldwide, with approximately two million new cases every year. The number of cases increases despite the high survival rate. The aim of this study is, therefore, to understand this cancer by finding out what has been studied in this area using scientific evidence published between 2003 and 2023. A search was therefore carried out for scientific articles and other relevant sources on the subject with free access, and 48 documents were then analyzed. According to the analysis, many studies have been conducted in the area, particularly on quality of life and body image. However, little has been done in terms of environmental sustainability and breast cancer.

Keywords: Breast Cancer, Psychology, Mental Health, Cognitive Behavioral Therapy

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1. Introduction

Breast cancer is a heterogeneous complex of diseases, i.e., a spectrum of various subtypes with distinct biological characteristics that lead to different response patterns to various treatment modalities, as well as different clinical outcomes [1, 2]. However, the exact etiology of cancer remains unknown, but family history has a strong influence on risk, due to hereditary implication factors [1]. Several independent groups and technologies in the study of understanding gene expression in various sets of tumors have identified five major subtypes of molecules: basal-like, luminal A, luminal B, HER2-positive, and normal breast-like [1, 2]. In order to understand the progression of the disease, it is crucial to have a basic understanding of these different subtypes. Thus, basal-like represents 8% to 37% of breast cancers and is associated with a high nuclear grade, poor tubule formation, and the presence of central necrotic and fibrotic zones. The terms triple-negative and basal-like are not synonymous, as triple-negative refers to the immunohistochemical classification of breast cancer tumors without ER (estrogen), PR (progesterone), and HER2 (protein). In contrast, the basal-like subtype is defined via gene expression microarray analysis [2]. The luminal-A subtype is the most common, accounting for 50% to 60% of all breast cancers, having the best prognosis, and the relapse rate is significantly lower than other subtypes [2]. Consequently, basal-like tumors have the worst prognosis, while luminal A has the best [1]. As for luminal B, it comprises around 15 to 20 percent of breast cancer cases and has a more aggressive phenotype, a worse prognosis, high recurrence, and a low survival rate [2]. In addition, the HER2-positive subtype accounts for 15% to 20% of breast cancers, is biologically aggressive and has a worse prognosis [2]. Finally, the standard breast-like subtype accounts for around 5 to 10% of breast carcinomas and has an intermediate prognosis between the luminal and basal subtypes and generally does not respond to neoadjuvant chemotherapy [2]. Indeed, germline mutations in high-penetrance cancer susceptibility genes, including BRCA1,

BRCAE2, and TP53, account for less than 25 percent of the excess risk; variations in moderate and low penetration genes are likely to explain most cases [1].

Breast cancer can be diagnosed in different ways: through a clinical breast examination, mammography, ultrasound, magnetic resonance imaging or biopsy [3]. Mammography is the most used test and can also detect the size and type of tumor, among other things [4]. Ultrasound is an image captured using high-frequency sound waves, which makes it possible to check whether it is a cyst or a cancerous mass. Magnetic resonance imaging is used in women at high risk of breast cancer. It is a procedure that uses a high-powered magnet, radio waves and a computer to sequence detailed images of areas inside the Breast [4]. A biopsy aims to remove tissue or fluid for analysis [3].

Currently, the quality and effectiveness of treatment are evident in the prognosis of these patients since the focus of clinical care is not only on the quantity of life but also on its quality [5].

According to the [4], there are several types of treatment for breast cancer patients. The treatments can be local (e.g., surgery and radiotherapy) or systemic (e.g., chemotherapy, hormone therapy, and targeted therapy).

Most patients undergo surgery to remove the cancer, which can be a conservative operation that removes only the cancerous tissue and a little normal tissue around it. However, they may opt for a mastectomy, which involves removing the entire Breast that has cancer. Radiotherapy uses high levels of energy rays to kill cancer cells and stop them from growing. There are also two types of radiotherapy: external (radiation through a machine) and internal (radiation through an implant) [4].

Chemotherapy is the use of drugs prescription to stop the growth and division of cancer cells, administered orally in tablets or intravenously. There are various promoting and inhibiting factors in the use of chemotherapy reported by women aged 65 and over, as shown in a qualitative study done by [6]. Chemotherapy and radiotherapy are carried out before surgery to remove the tumor in order to reduce the amount of tissue that needs to be removed; this treatment before surgery is called neoadjuvant therapy. In contrast, hormone therapy stops the growth of tumor-sensitive hormones by blocking the body's ability to produce hormones or by interfering with the effects of hormones on breast cancer cells. In addition, targeted therapy uses drugs or other substances to identify and attack specific cancer cells; these monoclonal antibodies (e.g., trastuzumab) can be combined with chemotherapy as adjuvant therapy [4].

Consequently, the choice of treatment depends on the stage of the disease, the size of the tumor, the test results, the woman's menopausal status, and the person's state of health [3]. As for the staging of the disease, stage 0 corresponds to lobular carcinoma in situ (CLIS), in which no treatment is required, only surgery. Moreover, ductal carcinoma in situ (DCIS) requires conservative surgery and radiotherapy. In stages I and II, women generally opt for conservative surgery or mastectomy. In stages II and IIIa, those with a large tumor can undergo neoadjuvant treatment, with chemotherapy followed by surgery. In stages IIIb and IIIc, chemotherapy is usually given, followed by mastectomy conservative surgery or radiotherapy [3]. In stage IV, the cancer has already spread to other areas of the body (metastatic breast cancer), and chemotherapy is given, which may not cure the disease but may improve the person's quality of life in order to slow down the progression of the disease [4] . At this stage, people can receive palliative care. There can also be a recurrence of breast cancer, which reappears after treatment [3].

As for the symptoms resulting from the treatments experienced, these can be both physical and psychological, including chronic pain, anxiety, loss of appetite, hair loss, vomiting and nausea, depression, delirium, fatigue and high fever [7]. They may also have functional deficits such as reduced shoulder range of motion and cognitive impairment. In addition, there may be sleep problems such as insomnia and recurrent sexual dysfunction from surgical interventions (e.g., radiotherapy, chemotherapy, hormone treatment), affecting a woman's self-image [7].

Symptoms appear between the second and third week of treatment, with emotional consequences such as depression, worry, fear, and anger [8]. In addition, it should be emphasized that in cancer patients, their fear is not irrational nor unrealistic because they are continually subjected to diversities that are a real threat. They can develop symptoms about the fear of the disease, its progress, and all the consequences that come with it. It is, therefore, pertinent to make a good distinction between anxiety and fear of the progression of the disease, and it is urgent to use appropriate instruments adapted for the oncological population [9].

On the other hand, all the difficulties that can arise in the lives of these patients as a result of treatment and associated with a diagnosis of depression and anxiety make it difficult to understand since coping strategies are even more deteriorated, preventing treatment adherence, increasing hospitalization, increasing costs and deteriorating quality of life [7]. It is therefore necessary to provide emotional and psychological care and assistance to improve the quality of life of these patients, according to their needs, adopting a biopsychosocial approach [7].

In 2020, there were 2.3 million new cases of breast cancer, corresponding to 12 percent of the total number of new cases. In contrast, the number of breast cancer-related deaths was 684,996 (6.9% of the total) [10].

Breast cancer has been on the rise in developed countries despite the high socioeconomic income of these women. However, in recent decades, the mortality rate in these countries has been falling due to efficient and early diagnosis and organized prevention programs [11, 12]. However, the highest mortality rate among women with breast cancer is in less developed countries, particularly African American countries, due to their low socioeconomic status and genetic expression since there is a higher frequency of the basal-like subtype, characterized by a worse prognosis [1, 11].

In Portugal, 7041 cases of breast cancer have been estimated, equivalent to 26.4% of the number of new cancer cases in 2020 [10]. Around 1,800 women die of breast cancer every year [3]. Screening allows for a 30 percent reduction in mortality, with a mammogram every two years from the age of 50 to 69 [13].

In the Autonomous Region of Madeira (RAM), in Portugal, an ultra-peripherical region in the south Europe, an average of 200 new cases of breast cancer are diagnosed each year. Screening in this region is carried out on women between the ages of 45 and 74 (the screening that covers the most ages in the country), i.e., if it is detected earlier, treatment is effective, and survival rate after five years is approximately 85 percent [14].

As for gender analysis, breast cancer is the most common cancer among women, and there is more research into it due to its mental and psychosocial aspects, as it affects an organ with great symbolism in terms of motherhood, sexuality, and aesthetics [7]. In addition, [15] report that breast cancer affects less than 1% of men and is more prevalent in older men. The BRCA2 gene mutation is the most significant risk factor for developing breast cancer in men, as well as family history, exposure to radiation, and hyperestrogenism (e.g., Klinefelter's syndrome). They, therefore, have a high risk of developing a second cancer. Furthermore, diagnosis in these cases is often made late due to a lack of awareness of the existence of cancer in this sex and ignorance of the associated risk factors [15]. In addition, breast cancer is present in transgender men with a risk dependent on surgery because those who have had a mastectomy have a lower risk of developing breast cancer compared to cisgender women [15].

That said, according to the [16], breast cancer is prevalent in the 40 to 60 age group, corresponding to the Generation X (individuals born between 1965 and 1981). This generation experienced a period of technological evolution and advancement. In Portugal, for instance, it was the last generation before and after 25 April 1974, the year of implementation of democracy after a vast period of political dictatorship. This generation values ambition, independence, freedom and the fight for a better world. These characteristics can influence how a human being's development is experienced, as well as

the skills they acquire throughout their lives, which they later put into practice at a more vulnerable moment/phase, such as breast cancer.

According to [17], there are some normative changes in women's physical, cognitive and psychosocial development in middle adulthood.

Firstly, on a physical level, there is the menopausal transition, characterized by perimenopause or "change of life," a period of 3 to 5 years in which women face physiological changes due to the slowdown in estrogen production, menstruation becomes irregular, with less flow and a longer interval between menstrual cycles. It is followed by menopause, when menstruation and the ability to bear children cease one year after the last menstrual cycle, with the main symptoms being hot flushes, vaginal dryness, and urinary dysfunction. Thus, menopause is seen as a transition, a change in roles, associated with greater independence and personal growth, but symptoms and attitudes also depend on cultural factors [17].

Regarding cognitive development, fluid intelligence decreases while crystallized intelligence improves. It consists of the ability to remember and utilize information acquired through various experiences throughout life, dependent on the individual's education and culture. There is integrative thinking at this stage of life, in which knowledge about the human condition is translated into the form of inspiring stories for the younger generation in order to obtain guidance. Cognitive functions (e.g., verbal fluency, spatial orientation, verbal comprehension, numerical aptitude, inductive reasoning, perceptual speed) show strong performance in people under 60, but there is significant individual variability [17].

In psychosocial development, there are two primary tasks: (a) accepting the transition from young adulthood to middle adulthood and (b) recognizing mortality. Mid-life crises" can occur, which is characterized by increased stress over the individual's review and reassessment of their life. People with high levels of resilience successfully overcome this phase due to their greater flexibility and adaptation to sources of stress. Regarding social relationships, people seek out others who make them feel good, promoting their well-being because these friendships are a source of pleasure and comfort. In terms of marital life, divorce can be a stressful time in this age group and cause a change of life, but it can be less threatening to well-being than in young adulthood. Adult sons leave their families home by this stage, corresponding to the empty nest phase of the life cycle, which can be liberating but stressful and difficult for many women who have placed their entire identity in the role of mother [17].

2. Methodology

This work aimed to research the existing literature review on breast cancer between 2003 and 2023, with the primary objective of finding scientific articles on what has already been studied on the subject, existing interventions, and limitations and gaps in research. The search was done on B-on, PubMed, Google, Google Scholar, ScienceDirect and Springer databases using the keywords: "breast cancer," "psychology," "mental health," "risk factors," "treatment," "intervention," "sustainability," using the Boolean operators "AND" and "OR" and the truncators " and "?". The research was carried out between 21 September 2023 and 21 October 2023.

The inclusion criteria were: scientific articles related to breast cancer, websites of relevant organizations about the topic and written in English and Portuguese with free access. The exclusion criteria were scientific articles published before 2003 or with paid access. It resulted in 48 documents being analyzed (see Table 1).

Table 1. Authors, Year of Publishing keywords, Data basis and Research date

Autores e Ano	Palavras-Chave	Base de Dados	Data Pesquisa

Abdollahi et al., 2022	*"Breast cancer"; "psychology"; "quality of life"; "well-being"*	B-on	16/10/2023
Almeida et al., 2023		Recomendação Docente	28/09/2023
Barchitta et al., 2020	*"breast cancer"; "diet"; "nutrition"; "intervention"*	B-on	21/10/2023
Brandão et al. 2020	*"breast cancer"; "sustainability"; "psychology"*	ScienceDirect	5/10/2023
Cabral, 2023		Recomendação Docente	17/10/2023
Chapman et al., 2020	*"breast cancer"; "psychology"; "quality of life"; "well-being"*	B-on	16/10/2023
Conceição & Bueno, 2020		Recomendação Docente	26/09/2023
D'Souza et al., 2017	*"breast cancer"; "psychology"; "quality of life"; "well-being"*	B-on	13/10/2023
Direção Regional da Saúde, 2023	*"Cancro da Mama"; "Madeira"*	Google	6/10/2023
Direção Regional da Saúde, 2023	*"Plano Regional de Saúde"*	Google	25/09/2023
Djuric et al., 2011	*"breast cancer"; "diet"; "nutrition"; "intervention"*	B-on	21/10/2023
Fasano, et al., 2022	*"breast cancer"; "pandemic"*	Pubmed	5/10/2023
Figueroa et al., 2021	*"breast cancer"; "pandemic"*	Pubmed	5/10/2023
Fobair et al. 2006	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023
Global Cancer Observatory, 2021	*"statistics"; "breast cancer"*	Google	6/10/2023
Global Cancer Observatory, 2021	*"statistics"; "breast cancer"; "Portugal"*	Google	6/10/2023
Guthmuller et al., 2023	*"breast cancer"; "screening"*	ScienceDirect	5/10/2023
Hall et al., 2012		Recomendação Docente	21/09/2023
Ionescu et al., 2022	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023
Izci et al., 2016	"breast cancer"; "types"; "psychology"	Pubmed	5/10/2023
Jabłoński et al., 2018	*"breast cancer"; "psychology"; "quality of life"; "well-being"*	B-on	16/10/2023
Kreling et al., 2006	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023
Lavallée et al., 2019	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023
Lee et al., 2020	*"breast cancer"; "psychology"; "quality of life"; "well-being"*	B-on	16/10/2023
Lewis-Smith et al., 2018	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023
Li et al., 2023	*"breast cancer"; "pandemic"*	Pubmed	5/10/2023
Liga Portuguesa Contra o Cancro, 2023	*"Cancro da Mama"; "Estadiamento"*	Google	23/09/2023
Liga Portuguesa Contra o Cancro, 2023	*"Cancro da Mama"; "outubro rosa"*	Google	21/09/2023

Matthews et al., 2017	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023
McKinley et al., 2019	*"breast cancer"; "psychology"; "quality of life"; "well-being"*	B-on	16/10/2023
Monsell et al., 2021		Recomendação Docente	17/10/2023
Nações Unidas, 2023	*"Agenda 2030"; "sustentabilidade"*	Google	17/10/2023
National Breast Cancer Foundation, 2022	*"breast cancer"; "types of cancer"*	Google	6/10/2023
National Cancer Institute, 2020	*"breast cancer"; "risk factors; "cancer observatory"*	Google	25/09/2023
National Cancer Institute, 2023	*"breast cancer";" treatment"; "cancer observatory"*	Google	25/09/2023
Organização de Cooperação e de Desenvolvimento Económicos (OCDE), 2023	*"cancro"; "saúde"; "Portugal"*	Google	7/10/2023
Papalia & Feldman, 2013		Recomendação Docente	14/10/2023
Polyak, 2007	*"breast cancer"; "types"; "psychology"*	Google Scholar	6/10/2023
Przezdziecki, 2013	*"breast cancer"; "psychology"; "quality of life"; "well-being"*	B-on	16/10/2023
Serviço Nacional de Saúde (SNS), 2022	*"Cancro da Mama"; "Estadio"*	Google	23/09/2023
Silva et al., 2022		Recomendação Docente	28/09/2023
Tao et al. 2015	*"breast cancer"; "types"; "psychology"*	Google Scholar	6/10/2023
Todorov et al. 2019	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023
Watanabe et al., 2023		Recomendação Docente	28/09/2023
Yazdipour et al., 2023	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023
Ye et al., 2018	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023
Yersal & Barutca, 2014	*"breast cancer"; "subtypes"*	Springer	10/10/2023
Zimmaro et al., 2019	*"breast cancer"; "psychology"; "mental health"; "risk factors"; "treatment"; intervention"*	B-on	21/09/2023

3. Results

Women with breast cancer can develop psychopathology (e.g., depression and anxiety) before, during, and after neoadjuvant treatments, impacting how they cope with and recover from this stressful event in their lives [18].

Cognitive-behavioral therapy plays a vital role in the treatment of psychopathological symptoms [19]. In addition, it is beneficial to stimulate the patient's realistic thinking in order to help them recognize their thoughts and emotions so that they become adaptive and thus help them face everyday life with a better quality of life through the cognitive-behavioral techniques applied [20].

In addition, during the therapeutic process, motivational interviewing is an effective method for highlighting the client's motivation, emphasizing the client's importance for change, the confidence they have to change, and whether it is a priority. The psychologist must play an active role in their relationship with the client, being collaborative, evoking

their self-motivation and valuing their autonomy [21]. Therefore, the psychologist should advise the client on what to do for their health and genuinely listen to them with empathy and curiosity, understanding their motivations and aiming to empower the client, exploring their ideas with exploratory questions, not judging and promoting their self-efficacy [21].

4. Quality of life

Women with breast cancer are more likely to experience psychological problems, so it is essential to consider specific methods that improve their quality of life since the survival rate is high in these patients. However, many continue to live as survivors, that is, with little quality of life [22] . According to the study carried out by [23] to understand the predictors of quality of life in these patients, the authors concluded that higher levels of resilience increase quality of life, while more advanced stages of the disease and psychological distress decrease it.

[22] showed an indirect association between a sense of coherence and quality of life mediated by emotional distress. Sense of coherence means the ability to cope with stress, which consists of three key points: (a) comprehensibility, which refers to the person's sense of understanding their current situation and predicting future situations (b) manageability, in which the person feels capable of doing their tasks and managing them and (c) meaningfulness, when they cope with stress and seek meaning in their daily activities [22]. Therefore, the authors demonstrate the importance of capturing negative experiences in daily activities as a meaning of daily life rather than just the presence or absence of difficulty [22]. Consequently, changing how experiences are perceived gives them a new meaning that provides a better quality of life.

On the other hand, diet has a significant influence on our day, having a direct impact on our quality of life, especially in women undergoing breast cancer treatment [24]. Indeed, the cross-sectional study carried out by [25] aimed to investigate whether a Mediterranean diet (based on typical foods such as fish, nuts, olive oil) had any potential effect on quality of life in stage I-III patients who had completed radiotherapy or chemotherapy treatment within six months prior to recruitment. The authors concluded that low consumption of red meat and carbonated drinks, daily consumption of wine, and high consumption of stir-fried dishes had beneficial effects on several quality-of-life subscales [25]. On the other hand, they found that the use of olive oil as the primary source of fat, a low consumption of sweets and a high consumption of nuts were associated with adverse effects [25]. Thus, the authors found that the effect between the Mediterranean diet and quality of life was null [25]. However, the study by [24] highlights the need to adopt healthy lifestyles in interventions, particularly during treatment, to maximize health and well-being.

However, the practice of physical exercise in people with breast cancer has a significant impact, helping people to feel better about themselves and less stressed, providing more incredible energy to carry out their activities of daily living [26]. It promotes self-confidence, well-being, and a sense of control over their health, even if involvement in the task is lower due to the symptoms derived from the treatments, allowing these people to focus on their health rather than their illness [26, 27]. Thus, a more positive effect on the quality of life was found among women who practiced moderate physical activity, with a better score on their overall health status, emotionally and cognitively [25].

Thus, according to the literature, dietary care and physical exercise combined are an asset for improving the quality of life of these women [24,25].

On the other hand, Artificial Intelligence is present in today's world in an emerging and innovative way. It can be a facilitator mean to interventions based on virtual reality, being helpful and restorative in cognitive rehabilitation, as well as in managing symptoms in this population [28]. The authors [28] carried out a systematic review of the benefits

and disadvantages of these interventions and concluded that virtual reality could be a great support tool to intervene with these patients at different stages of treatment, reducing the associated symptoms and with the aim to reinforce cognitive functions, such as attention and memory. In this way, artificial intelligence can contribute to a better quality of life for these patients during and after treatments.

The literature indicates several constructs and dimensions (e.g., physical and psychological) that contribute to the quality of life of women with breast cancer, which are essential to take into account in their intervention and treatment in order to promote their well-being. Also, artificial intelligence allows us to open new horizons for increasingly innovative interventions to increase quality of life.

5. Body image

Body image is an aspect of human functioning that depends on our vitality and physical and social functionality. It is characterized by the mental image of one's own body, subjective in nature, the result of individual experience by the perceptions, feelings, emotions and competence of each person [29].

Most oncological diseases are treated with chemotherapy, radiotherapy, and other combined treatments. The symptoms resulting from these treatments impact the individual in their psychosocial form, making their body image and sexuality more susceptible, reducing their self-esteem and quality of life, and also contributing to cases of stress, depression, and anxiety [8]. Indeed, surgery can lead to breast asymmetry, scarring, a feeling of loss, and lymphedema, and adjuvant therapies include hair loss, fatigue, weight fluctuation, dermatitis, discoloration of skin and nails, and exacerbation of menstrual symptoms [30]. According to the study by [31], women with better psychosocial well-being are more likely to report greater satisfaction with their appearance and surgery results.

Additionally, body image, sexual activity and sexual problems are interconnected and are very common in women with breast cancer, with increased difficulties following treatment, particularly after surgery [29, 32]. There are some differences according to ethnicity, in which Latinas are more sexually active and report fewer sexual problems, and also the type of sexual dynamics, in which married women report more sexual problems than single women without children [29]. The authors [29] report that women who present this diagnosis have a less active sexual life and increased body image problems compared to women in the same age group. The authors highlight the importance of some critical points to take into account when professionals are in contact with this population: (a) women must be informed about the possible effects of treatment on their sexual activity, sexual functioning and their interpersonal relationships (b) married women can benefit from opportunities to talk in groups and with health professionals about complications experienced in their lives (c) programs and interventions should be tailored to help women who report low self-esteem, mental health problems and difficulties communicating with partners (d) develop programs for women with the diagnosis and also for partners, which are based on restoring, improving and maintaining effective communications about positive sexual relationships [29].

On the other hand, self-compassion in several studies has been increasingly studied in this area, being related to body image, and also, with stress and self-care [33, 34, 35]. Individuals with self-compassion present three fundamental principles: (a) acceptance and understanding of something greater than themselves in times of adversity, (b) appreciation that adversity and suffering are part of the human experience, (c) knowing your thoughts and feelings in a non-judgmental way, but honestly [35]. [34] found that body image and low levels of self-compassion are associated with increased psychological distress. Consequently, interventions must focus on promoting knowledge of emotions and self-knowledge and practicing self-compassion so that women have the skills to recognize their feelings, accept them, and know their limits. Therefore, the body image of

these women during and after treatments is effectively affected, influencing their self-esteem and sexual activity, making it crucial to develop self-compassion in each woman, promoting a fraternal and caring outlook towards herself and facing this phase of adversity. With a more positive perception of self, they are bringing greater well-being to life.

6. Environmental Sustainability

Currently, we are experiencing the impact of climate change on society and its consequences for health, so it is urgent to pay attention to health issues, particularly in cancer patients. Effectively, the entire society must act and adapt to this ecological emergency by adopting more sustainable practices, becoming aware of the activities that are currently used in health contexts, such as treatments and the materials that are applied, opting for choices with less impact on the environment to reduce carbon emissions [36].

On the other hand, a study carried out by [37] about the estimation of healthcare costs in the first three years after diagnosis reports that costs depend primarily on the subtype of cancer rather than the stage of the disease. Therefore, it is crucial to focus mainly on prevention, as it increases social capital, reducing treatment costs, as well as associated carbon emissions [36].

The objectives of Europe 2030 Agenda also point to the importance of quality and sustainable health to reduce mortality and promote mental health and well-being, considering increasingly sustainable practices [38].

Additionally, Portugal health plan (2021-2030) [13] pays attention to "sustainability in health, in order to promote a healthy, resilient, fair and prosperous community and environments, which safeguard the response to the needs of current populations, without compromising the future generations" [14, p. 5]. Consequently, its objective is to reduce mortality and morbidity, the leading causes and risk factors associated with malignant tumors, in particular breast cancer. Furthermore, within the scope of sustainable development, several determinants for health are presented: (a) social, (b) economic, (c) environmental, (d) biological, (e) behavioral; (f) health care and (g) demographics, which are of unavoidable consideration [14].

Therefore, positive, and significant changes in behavior could be made sustainable by modifying habits to improve health and achieve goals in terms of environmental sustainability [39].

The temporary suspension of services during the COVID-19 pandemic led to a significant reduction in breast cancer prevention screenings and a delay in diagnosis and treatment [40, 41]. Consequently, few cases were at a lower stage of the disease, but a large proportion of the reported cases were at more advanced stages than in the pre-pandemic period [41]. It is particularly recurrent in patients who are more likely to have advanced-stage tumors, as well as difficulties in accessing healthcare [40]. Therefore, the treatments required were intensive, and mortality rates increased [42].

[40] propose the "Call to Action" model in order to provide strategies to mitigate disparities in breast cancer related to healthcare observed during the pandemic: (a) investigate the impact of COVID-19 breast cancer outcomes in specific breeds; (b) educate providers about breast health disparities; (c) assess the psychosocial impact and social injustices; (d) maintain and support patient navigation programs and (e) increase enrollment of racial and ethnic minorities in clinical trials.

On the other hand, the pandemic affected people's work routines, and a study carried out by [43] at the peak of the pandemic aimed to understand its effects on safety and emotional functioning at work in women with breast cancer. The authors found that women who were unable to work experienced a greater level of threat or uncertainty surrounding their long-term job security but had high levels of emotional resilience to return to work and improve their efficiency [43]. Furthermore, they concluded that cognitive function is a moderator of the relationship between job security and anxiety,

and women with better cognitive functioning are less vulnerable to anxiety when job security is of little concern [43]. Thus, the results of the research carried out suggest that the impacts of COVID-19 on work in women with breast cancer demonstrate susceptibility to the development of affective disorders (e.g., depression and anxiety) and worse cognitive functions [43].

In Portugal, one of the priorities for 2020 was to increase breast cancer screening rates, but the COVID-19 pandemic affected cancer screening programs, resulting in a temporary decrease in screening rates [44].

In short, with the pandemic, cases of breast cancer were aggravated, resulting from delays in screening, involving increased efforts on the part of health professionals in an attempt to overcome this problem.

7. Final reflections

After research and data collection, we highlighted the existence of a vast scientific literature on the topic. As for the investigation resulting from the research carried out, we noted a gap regarding environmental sustainability, highlighting the importance of future investigations focusing on this current issue, studying and opting for new forms of treatment that are more sustainable.

In this logic, future research must understand how climate change influences the quality of life of people with breast cancer and what the implications are for their well-being. Furthermore, there is a need to provide literacy about the environmental impact to health professionals in this area and patients with breast cancer so that they can choose options with the least harm to the environment. At the same time, the treatment improves patient health and quality of life [36].

Additionally, it is essential to use assessment instruments and intervention programs adapted and validated for the Portuguese population of women with breast cancer [9]. Furthermore, it is essential to understand the exclusive role of diet and the interventions carried out in this context on people's quality of life during and after breast cancer treatment, as evidenced by the authors [25]. Furthermore, more studies are needed to understand how artificial intelligence can help these people reduce the impacts and implications in their daily lives [28].

Completing this work was challenging and complex; due to the vast amount of existing literature, it required a thorough, critical, and rigorous choice of articles. It also required an intense investigation of how to allocate the themes presented by scientific evidence (e.g., quality of life, body image, COVID-19) so that there was a common thread throughout the entire work so that there was a clear and objective presentation of the content on the topic of breast cancer.

Developing this state-of-the-art proved to be quite enriching and relevant as we had the opportunity to explore this topic, collecting a set of significant learnings and getting to know the problems many of these women face. Thus, we highlight the high relevance for future practice. This work made us aware of the importance of screenings being carried out early and promptly, psychoeducating society, and those around us. We also highlight the value of body image, affecting the way we face everyday life, thus highlighting the notoriety of self-care practices, which raise self-esteem so that we feel better about ourselves and others, hence the interest in addressing this dimension in intervention plans. In short, this state-of-the-art contributed to a summary of studies carried out in this area in different dimensions, proposing the need for future investigations in this area, essentially within the scope of environmental sustainability, in order to reduce the recurring ecological impact of treatments, promoting a better quality of life for these patients.

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