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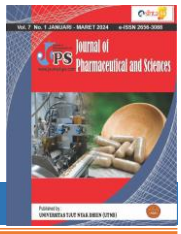

The Effect of Pharmacist-led Education and Counseling on Medication Adherence and Quality of Life in Breast Cancer Patients: A Literature Review

Pengaruh Edukasi dan Konseling Apoteker terhadap Kepatuhan dan Kualitas Hidup Pasien Kanker Payudara: Literatur Review

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Abstract

Pharmacist-led interventions, particularly through education and counselling, play an essential role in supporting treatment adherence and improving the quality of life of breast cancer patients. This article aims to review the influence of pharmacist interventions—such as medication counseling, side effect management, and adherence monitoring—on patient understanding, psychological aspects, and quality-of-life indicators. Results from various experimental studies and randomized controlled trials suggest that structured pharmacist interventions can improve patient understanding, reduce anxiety, and support adherence to long-term therapies such as tamoxifen and chemotherapy. Improvements were also observed in various domains of quality of life, including physical, emotional, and social functioning. However, some studies show inconsistent results, especially in terms of statistical differences in changes in quality of life, which may be due to factors such as sample size, duration of intervention, or other variables, including family support and disease prognosis. Overall, the involvement of pharmacists is an integral part of oncology care, serving as both an educator and a long-term therapy companion.

***Keywords**: Breast Cancer, Pharmacist Counseling, Medication Adherence, Quality of Life, Oncology Pharmacy.*

Abstrak

Intervensi yang dipimpin oleh apoteker, khususnya melalui edukasi dan konseling, memainkan peran penting dalam mendukung kepatuhan pengobatan serta meningkatkan kualitas hidup pasien kanker payudara. Artikel ini bertujuan untuk meninjau pengaruh intervensi apoteker—seperti konseling obat, manajemen efek samping, dan pemantauan kepatuhan—terhadap pemahaman pasien, aspek psikologis, dan indikator kualitas hidup. Hasil dari berbagai studi eksperimental dan uji acak terkontrol menunjukkan bahwa intervensi apoteker yang terstruktur dapat meningkatkan pemahaman pasien, mengurangi kecemasan, dan mendukung kepatuhan terhadap terapi jangka panjang seperti tamoxifen dan kemoterapi. Peningkatan juga terlihat dalam berbagai domain kualitas hidup, seperti fungsi fisik, emosional, dan sosial. Namun, beberapa studi menunjukkan hasil yang tidak konsisten, terutama dalam perbedaan statistik pada perubahan kualitas hidup, yang mungkin disebabkan oleh ukuran sampel, durasi intervensi, atau faktor lain seperti dukungan keluarga dan prognosis penyakit. Secara keseluruhan, keterlibatan apoteker menjadi bagian tak terpisahkan dalam perawatan onkologi sebagai edukator sekaligus pendamping terapi jangka panjang.

***Kata Kunci**: Kanker Payudara, Konseling Apoteker, Kepatuhan Pengobatan, Kualitas Hidup, Farmasi Onkologi.*

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Introduction

Breast cancer is the most prevalent cancer in women and a leading cause of cancer death worldwide. According to GLOBOCAN 2020 data, more than 2.2 million new cases of breast cancer were reported globally, with a significant burden in developing countries like Indonesia [1]. The success of breast cancer therapy, whether chemotherapy, hormonal therapy, or targeted therapy, depends heavily on patient adherence to the treatment regimen. However, patient satisfaction remains a significant challenge. A systematic review showed that non-adherence to oral therapies such as tamoxifen reached 47% [2]. In Indonesia, a study of patients taking capsitabine found an average adherence of 92.1% (SD 6.87%), but only 79.7% were classified as adherent (≥80%) [3].

Factors influencing non-adherence include drug side effects, lack of understanding of the therapy, and the psychosocial burden experienced by patients. In this context, pharmacists play a strategic role by providing pharmaceutical education and counseling to improve understanding, help manage side effects, strengthen confidence in treatment, and reduce patient anxiety. These pharmacist-led interventions are expected to increase patient self-efficacy in undergoing therapy, ultimately leading to improved compliance with treatment. Improved adherence will ultimately have a positive impact on patients' quality of life, including physical, emotional, and social aspects. Numerous studies support this mechanism. In Japan, pharmaceutical counseling has been shown to increase Quality Adjusted Life Years (QALYs) (0.007 ± 0.199 vs. -0.021 ± 0.186) with a cost-per-QALY ratio of ¥1,360,558 (~US$12,460), demonstrating good cost-effectiveness [4]. Another study by Tanaka et al. (2018).reported that pharmacist interventions can reduce therapy side effects and improve patient psychosocial well-being. Similar results were also found in Egypt, where patients who received 12 sessions of pharmaceutical counseling showed significant improvements in healthy lifestyle behaviors, such as breast self-examination (BSE) (81.7% vs. 23.1%; p = 0.005) and physical activity (52.2% vs. 17.1%; p = 0.002). In Indonesia, a study in Malang showed that pharmacy education significantly improved patient understanding scores ($p < 0.001$) [6].

Contextually, the relationship between pharmacist intervention, exposure, and quality of life can be explained through a causal pathway. Pharmacist interventions, including education and counseling (as independent variables), function to increase patient knowledge, reduce anxiety, strengthen self-efficacy, and build positive beliefs about treatment (as mediators). These psychological and cognitive changes then lead to increased adherence to the therapy regimen (output), which ultimately results in improved patient quality of life (outcome) across physical, emotional, and social dimensions. This relationship can be influenced by several mediating or confounding factors, such as family support, disease prognosis, and cancer stage, which can strengthen or weaken the impact of pharmacist interventions on patient clinical outcomes.

Therefore, pharmaceutical education and counseling not only play a role in improving adherence to treatment but also indirectly improve the quality of life of breast cancer patients by increasing their capacity for understanding, psychological management, and active engagement in therapy. This article aims to comprehensively review the scientific evidence regarding the contribution of pharmaceutical interventions to adherence and quality of life in breast cancer patients, while also providing evidence-based recommendations for strengthening clinical pharmacy practice in oncology.

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Method

This literature review was conducted systematically to identify and analyze studies that evaluated the effect of pharmacist-led education and counseling on medication adherence and quality of lifes in breast cancer patients. The literature search strategy was focused on two highly reputable international scientific databases, namely PubMed and Scopus, using a combination of keywords and Boolean operators, "Pharmacist" AND "Education" AND "Counseling" AND "Randomized Controlled Trial" AND "Adherence" AND "Quality of Life". The search was limited to English-language articles published between 2015 and 2025, specifically focusing on open-access and original research articles.

The inclusion criteria used in the selection included: (1) primary studies with RCT design, (2) adult populations with breast cancer, (3) the interventions provided are education or counseling by pharmacists, (4) reporting of medication adherence or quality of life, and (5) articles available in full text and English. The exclusion criteria include: (1) articles in the form of literature reviews, editorials, comments, and letters to editors; (3) studies with specific populations such as children, pregnant women, or patients with severe cognitive impairment; (4) articles that do not report relevant clinical outcomes; and (5) articles identified as duplicates.

Discussion

Treatment Adherence in Breast Cancer Patients

The WHO defines long-term medication adherence as the extent to which patients implement the recommendations of health professionals regarding medication, diet, and lifestyle changes [7]. Subjective measurements, such as self-reports and assessments by healthcare professionals, are the most commonly used methods for evaluating patient outcomes. However, a significant drawback is that patients are less likely to report non-adherence to avoid rejection from healthcare providers. Objective measurements include pill counts, electronic monitoring, secondary database analysis, and biochemical measurements. Objective measurements can be used to validate and correlate subjective measurements [8]. Several adherence measurement methods have been designed and validated for breast cancer patients. The techniques that have been used include Medication Possession Ratio (MPR) or Proportion Days Covered (PDC), Pill count, Morinsky Medication Adherence Scale (MMAS), or a combination of objective and subjective methods [9,10].

Some factors that can affect breast cancer patients' non-adherence include the burden of side effects, the patient's perception of treatment, and lack of social support [11]. A review article mentioned several side effects occurring in patients using Adjuvant Endocrine Therapy (AET), such as bleeding, gastrointestinal discomfort, and arthralgia [12]. A study suggests that patients perceive stopping treatment as a way to reduce side effects and improve their quality of life. Others continue treatment despite the appearance of AET side effects, because they think they will get greater benefits than the risk of side effects [13].

Quality of Life (QOL) of Breast Cancer Patients

Quality of life is a crucial aspect that reflects the physical, psychological, social, and spiritual well-being of the patient. Fatigue, pain, and insomnia are the physical symptoms that most often decrease the patient's quality of life after therapy. A study in Iran found that social support had a significant impact on the health-related quality of life of breast cancer patients ($p < 0.001$) [14]. Perceptions of illness, anxiety, and post-diagnosis stress play a huge role in mental well-being. Spiritual/religious interventions based on mindfulness and coping strategies have been shown to reduce anxiety and depressive symptoms, as well as improve the psychological well-being of cancer patients [15]. The support of family, friends, and health workers has been shown to strengthen social adaptation and reduce feelings of isolation. A qualitative study in Singapore (2019; n = 28) showed that spiritual and sociocultural experiences (transcendence, meaning of life) enhance the social adaptation of breast cancer patients [16]. Spirituality is the primary dimension of supporting QOL. A survey in Brazil (n = 108) found a positive correlation between spirituality and the general QOL of breast cancer patients[17].

In general, quality of life instruments evaluate multidimensional domains, including physical, psychological, social, role-functioning, spiritual, and disease symptoms or side effects. Several instruments have been developed and validated as a measuring tool used to measure the quality of life of breast cancer patients, including the European Organisation for Research and Treatment of Cancer QoL Questionnaire

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(EORTC QLQ-C30) [18–20], *Functional Assessment of Cancer Therapy-Breast* (FACT-B) [21], and *EuroQol 5-Dimensions 5-Levels* (EQ-5D-5L) [22,23]. An explanation of the QOL instrument is presented in **Table 1.**

Table 1. Comparison of Instruments of Quality of Life of Breast Cancer Patients

Aspects	EORTC QLQ-C30	FACT-B	EQ-5D-5L
Developer	European Organisation for Research and Treatment of Cancer	Functional Assessment of Chronic Illness Therapy	EuroQol Group
Purpose	Specific cancers (all types of cancer)	Specific to breast cancer patients	General (all diseases and general population)
Number of Questions	30 items + BR23 module (23 items))	37 items (including breast cancer subscale)	5 item + 1 visual analog scale (VAS)
Measured Domains	1. Physical, emotional, cognitive, social, role functions 2. Symptoms: fatigue, pain, insomnia, nausea, etc.. 3. Global health	1. Physical, social/family, emotional, functional well-being. 2. Breast cancer-specific problems (pain, body shape, sexuality)	1. Mobility 2. Self-care 3. Daily activities 4. Pain/discomfort 5. Anxiety/depression
Rating Scale	4 points (1 = nothing at all – 4 = very much)	5 points (0 = nothing at all – 4 = very much)	5 levels (1 = no problem – 5 = heavy problem) + VAS 0–100
Duration	±10–15 minutes	±10–15 minutes	±2–5 minutes
Advantages	Details on cancer symptoms & patient function	Focus on specific aspects of breast cancer	Simple and easy to use in clinical & economic practice
Limitations	Doesn't generate direct utility values	Long enough if the patient is weak	Lack of detail for specific symptoms of cancer

Quality of life often decreases during therapy, but it can be improved with appropriate interventions. A meta-analysis found that *e-health* interventions significantly affected patients' anxiety ($p < 0.01$), depression ($p = 0.026$) and QoL ($p < 0.01$). This study shows that *e-health* interventions can improve quality of life (QoL) in adult breast cancer patients [24]. A meta-analysis found that exercise interventions had a significant effect on the quality of life, social function, and physical function ($p< 0.005$) of breast cancer survivors [25]. The exercise group showed a significant improvement in quality of life for the role function variable from baseline to 3 months ($p < 0.001$), in contrast, the control group showed a significant improvement after only 6 months ($p = 0.02$) [26]. RCTs in China ($n = 200$) examined the combined programs (joint mobility, aerobic/resistance training, and intensive follow-up) most effective in improving QoL and reducing lymphedema and pain (FACT-B) [27]. Strengthening support for caregivers via psycho-social significantly increased the patient's QoL (SMD = 1.00) and reduced depression/anxiety [28]. E-Health interventions, exercise, and social support are effective in increasing the QoL of breast cancer patients. The combination of physical and psychological support, along with symptomatic therapy, offers improvements in the physical, emotional, and spiritual dimensions of the patient.

The Role of Pharmaceutical Education and Counseling

Pharmacists play a central role in treatment education, side effect management, and patient adherence monitoring, which has been shown to have a positive impact on the quality of life of breast cancer patients. Interventions such as live counselling, leaflet provision, medication review, and follow-up visits have shown their effectiveness in various studies. The Iraq study reported significant improvements in five functional domains (physical, role, emotional, cognitive, and social) as well as a decrease in symptoms (fatigue, nausea/vomiting, and pain) after education by pharmacists using pamphlets ($p < 0.05$) [29]. In Japan, a review of studies found that allocating 75 hours per month to pharmacists for education and monitoring of side effects resulted in a reduction in symptoms and a more rational use of antiemetic drugs [30]. In addition, pharmacist education has been shown to improve the balance between patients' needs and concerns, especially in those receiving counseling for the first time [31], and to increase patients' trust and consistency in undergoing therapy according to their beliefs [32]. These findings reinforce the pharmacist's position as an essential part of the oncology team, not only as a provider of drug information, but also as an ongoing therapeutic companion.

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Related Study Review

A review of three studies showed that there was variation in outcomes related to the effect of pharmaceutical interventions on adherence and quality of life in breast cancer patients (Table 2). The results of a review of two articles showed that pharmaceutical interventions of an educational nature improved patients' adherence scores and quality of life [4,33]. Education by pharmacists is essential to improve patient adherence to long-term therapy. Pharmacist interventions had a positive impact on medication adherence, treatment beliefs, and tolerability of side effects. Pharmacist education can improve cancer patients' understanding of hormonal therapy. These findings suggest that pharmacist interventions support improved medication adherence in pharmaceutical oncology care services [3].

Table 2. Summary of article analysis results

Author (year)	Research design	Sample	Pharmacist intervention	Key Findings
Bash and Rabea (2025)	Randomized controlled study	CG: 35 IG: 35 Regimen: Tamoxifen	The pharmacist delivered educational information tailored to each patient's specific treatment regimen.	There was a statistically significant difference in knowledge scores between CG and IG at 3 months after the intervention ($P < 0.001$). Significant improvement in the IG's adherence score between baseline and 3 months after intervention ($P < 0.001$). Significant differences in adherence scores between CG and IG at 3 months after the intervention ($P < 0.001$).
Tanaka et al (2019)	Experimental study	CG: 19 IG: 19 Regimen: Anthracyclines (EC/FEC), Taxanes (TC/nabPTX/PTX +B), other (CMF)	Pharmacist counseling	There was no significant difference in EQ-5D values before the first chemotherapy treatment between CG, but the IG had significantly higher EQ-5D values before the second and third treatments.
Tanaka et al (2018)	Experimental study	CG: 19 IG: 20	Pharmacist counselling	There were no statistically significant differences in comparisons between groups regarding total QOL-ACD scores or averages for each subscale before the 1st, 2nd, or 3rd course

Note: CG: Control Group, IG: Intervention Group, EC: epirubicin/cyclophosphamide, FEC: fluorouracil/epirubicin/cyclophosphamide, TC: docetaxel/cyclophosphamide, nab-PTX: nanoparticle albumin-bound paclitaxel, PTX: paclitaxel, BV: Bevacizumab CMF: cyclophosphamide/methotrexate/fluorouracil

The results of the review of the two articles showed that there was no statistically significant difference in quality of life scores between the intervention and control groups ($p > 0.005$), but the counseling group's QALY score was higher than the control group's [4,5]. In line with previous research that found that the presence of oncology pharmacists could improve QALY scores in the intervention group, there was no significant difference between the control and intervention groups [34]. Several factors, such as the short duration of the intervention, the small sample size, or the influence of other factors, including family support and disease prognosis, can contribute to this. Although pharmaceutical interventions have no significant effect on quality of life, they can improve patient adherence. A meta-analysis of RCTs found that pharmaceutical interventions can improve patient adherence and reduce drug therapy-related problems [35]. Medication adherence tends to respond more directly to educational and behavioral support provided by pharmacists, beliefs about medication, and tolerability of side effects [3], while quality of life (QoL) is influenced by more complex and multifactorial elements [36].

A study mentioned that EQ-5D-5L scores increased after pharmacist intervention against the side effects of chemotherapy drugs [37]. Differences in study duration may also explain the variation in QoL outcomes—short-term interventions may not provide enough time for improvements in physical or psychosocial well-

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being to manifest [38]. In addition, heterogeneity in QoL measurement tools across studies could lead to variations in sensitivity to detect changes [39]. Social and family support, disease prognosis, and treatment phase may further modulate patients' perceptions of their quality of life, overshadowing the direct effect of pharmacist interventions. Thus, while pharmaceutical interventions have a clear and measurable positive impact on adherence and patient knowledge, their influence on QoL may require a longer, continuous, and multidisciplinary approach to capture meaningful improvements.

These results suggest that although the role of pharmacists is essential in accompanying patients, the effect of interventions on quality of life can be influenced by many other factors such as symptom intensity, phase of therapy, and patient social support. Thus, pharmaceutical interventions can have a real positive impact on educational and adherence aspects, but their effects on quality of life require a more comprehensive and sustainable approach.

Research Limitations

This review has some limitations that need to be acknowledged. First, the number of high-quality randomised controlled trials (RCTs) that specifically evaluate pharmacist-led interventions in breast cancer patients is still limited, especially in low- and middle-income countries. Second, the studies included in this review exhibited considerable heterogeneity in terms of the type of intervention, duration, outcome size, and tools used to assess adherence and quality of life, rendering direct comparisons challenging. Third, some of the studies reviewed reported statistically insignificant differences in quality of life scores, which may be due to small sample sizes, short follow-up periods, or immeasurable confounding factors such as family support or early psychological status. Fourth, the heterogeneity in the types and components of pharmacist interventions themselves—such as face-to-face counseling, educational leaflets, medication monitoring, or telephone follow-ups—may have contributed to variations in study outcomes. Additionally, this review is limited to articles published in English and Indonesian, which may exclude relevant studies in other languages. Finally, publication bias cannot be ruled out, as studies with positive results are more likely to be published than studies with zero findings.

Conclusions

This review confirms that pharmacist education and counseling play a crucial role in improving medication adherence and quality of life in breast cancer patients by increasing knowledge, reducing anxiety, and strengthening confidence in therapy. Although not all studies demonstrate significant improvements in global quality of life scores, consistent benefits in understanding and adherence reinforce the urgency of pharmacist involvement in multidisciplinary oncology teams. Hospitals are advised to allocate a minimum of two to three hours per week for pharmacists to provide structured counseling to every ten active patients, focusing on medication education, side effect management, and adherence monitoring. Future research should include multi-center, randomized, controlled clinical trials with long-term intervention durations (>6 months), using validated quality of life instruments such as the EORTC QLQ-C30 and FACT-B, and evaluating mediators such as knowledge, self-efficacy, and anxiety. This approach is expected to strengthen standards of oncology pharmacy practice and have a significant impact on improving patient adherence and quality of life sustainably.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Supplementary Materials

There is no supplementary materials are available.

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