THE EFFECT OF A CULTURE-BASED MHEALTH APPLICATION "BERSAMA PEDULI" ON PAIN, SLEEP, AND FATIGUE AMONG CANCER PATIENTS

Joko Supriyanto[1], Nur Chayati[2]

[1,2]Master of Nursing, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia
j.supriyanto.psc22@mail.umy.ac.id

Abstrak

Pasien kanker umumnya mengalami kelompok gejala psikologis dan fisiologis yang kompleks, terutama nyeri, gangguan tidur, dan kelelahan. Gejala-gejala tersebut memerlukan manajemen yang komprehensif dan berkelanjutan. Studi ini memperkenalkan pendekatan inovatif non-farmakologis melalui aplikasi mobile health (mHealth) berbasis budaya Bersama Peduli untuk mendukung manajemen gejala primer. Penelitian ini bertujuan mengevaluasi pengaruh penggunaan aplikasi mHealth Bersama Peduli terhadap nyeri, kualitas tidur, dan kelelahan pada pasien kanker. Penelitian menggunakan desain kuasi-eksperimental dengan pendekatan one-group pre-test–post-test. Sampel terdiri dari 36 pasien berusia 18–75 tahun yang dipilih melalui purposive sampling. Intensitas nyeri diukur menggunakan Visual Analog Scale (VAS), gangguan tidur menggunakan Pittsburgh Sleep Quality Index (PSQI), dan kelelahan menggunakan Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT–F). Pengukuran dilakukan selama periode intervensi empat minggu. Analisis data menggunakan uji Wilcoxon. Hasil penelitian menunjukkan perbaikan signifikan pada nyeri, gangguan tidur, dan kelelahan, dengan nilai p sebesar 0,001 (p < 0,05) pada seluruh indikator. Temuan ini menunjukkan bahwa aplikasi mHealth berbasis budaya Bersama Peduli efektif dalam menurunkan nyeri, meningkatkan kualitas tidur, dan mengurangi kelelahan pada pasien kanker. Integrasi intervensi ini ke dalam strategi perawatan kanker yang komprehensif sangat direkomendasikan.

Kata Kunci: *Aplikasi Mobile, Berbasis Budaya, Kanker, Nyeri, Kualitas Tidur, Kelelahan*

Abstract

Cancer patients commonly experience complex clusters of psychological and physiological symptoms, particularly pain, sleep disturbances, and fatigue. These symptoms require comprehensive and continuous management. This study introduced an innovative, non-pharmacological approach using a culture-based mobile health (mHealth) application Bersama Peduli to support primary symptom management. The study aimed to evaluate the effect of the Bersama Peduli mHealth application on pain, sleep quality, and fatigue among cancer patients. A quasi-experimental design with a one-group pre-test–post-test approach was employed. The sample consisted of 36 patients aged 18–75 years, selected through purposive sampling. Pain intensity was assessed using the Visual Analog Scale (VAS), sleep disturbances using the Pittsburgh Sleep Quality Index (PSQI), and fatigue using the Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT–F). Measurements were taken over a four-week intervention period. Data were analyzed using the Wilcoxon test. The findings demonstrated significant improvements in pain, sleep disturbances, and fatigue, with all outcomes showing p-values of 0.001 (p < 0.05). These results indicate that the culture-based mHealth application Bersama Peduli effectively reduces pain, improves sleep quality, and decreases fatigue among cancer patients. Integration of this intervention into comprehensive cancer care strategies is strongly recommended.

Keyword: *Mobile Applications, Culture-Based, Cancer, Pain, Sleep Quality, Fatigue*

* Corresponding author :
Address : Universitas Muhammadiyah Yogyakarta, Indonesia
Email: j.supriyanto.psc22@mail.umy.ac.id

INTRODUCTION

Cancer remains a major global health concern, with more than 20 million new cases and 9.7 million deaths recorded in 2022. By 2050, cancer incidence is projected to exceed 35 million cases, and cancer mortality is expected to nearly double (WHO, 2024). In Indonesia, the prevalence of tumors or cancer has increased from 1.4 per 1,000 population in 2013 to 1.8 per 1,000 in 2018, with more than one million documented cases nationwide (Kementerian Kesehatan Republik Indonesia, 2018). These trends illustrate the rising burden of cancer and emphasize the need for accessible, continuous, and patient-centered supportive care. Cancer significantly compromises patients' quality of life, with many experiencing multiple co-occurring symptoms such as pain, sleep disturbances, and fatigue (Perkumpulan PRAKARSA, 2023).. These symptoms frequently cluster together, interact synergistically, and substantially impair physical, emotional, and functional well-being. Symptom management is challenging due to individual variability, the fluctuating nature of symptoms, and limited opportunities for continuous monitoring outside clinical settings(Omran et al., 2017). Additionally, 30%–40% of patients experience psychological distress such as anxiety and depression (Crafoord et al., 2020), while chronic pain and cancer-related fatigue are consistently associated with reduced functioning and diminished quality of life (Berger et al., n.d.; Hu et al., 2025; Xu et al., 2025; Zhang & Guo, 2025).

To address these challenges, mobile health (mHealth) interventions have been increasingly utilized to support symptom monitoring, patient education, and self-management. mHealth applications provide real-time access to information, symptom tracking, psychological support, and cost-effective scalability (Çınar et al., 2021; Liao et al., 2022; Wang et al., 2020). Evidence indicates that mHealth can reduce pain and enhance patient engagement (Hou et al., 2020; Seven et al., 2022; Spahrkäs et al., 2022), although findings regarding psychological outcomes remain inconsistent (Furness et al., 2020). Despite these benefits, most existing mHealth interventions lack culturally grounded features, even though culturally aligned approaches have demonstrated advantages in emotional regulation, comfort, and engagement. In Indonesia, cultural elements such as murattal, Javanese gamelan, and spiritual-based relaxation are commonly used in supportive care and have shown effectiveness in reducing anxiety, emotional distress, and pain perception. However, no mHealth application in Indonesia has integrated culturally based audio-visual components specifically designed to address the interconnected symptoms of pain, sleep disturbances, and fatigue in cancer patients (Rochmawati, 2022).

Given this gap, there is currently no culturally grounded mHealth intervention in Indonesia that combines culturally relevant therapeutic audio-visual modalities to simultaneously improve pain, sleep quality, and fatigue among cancer patients. Therefore, this study seeks to determine whether the culture-based mHealth application Bersama Peduli can improve pain, sleep quality, and fatigue after four weeks of use.

METHODS

The research utilized a quantitative design, employing a quasi-experimental methodology with a pretest and posttest group framework. The study occurred from November 2024 to January 2025. The population was in the cancer room RSUD Dr. Moewardi Surakarta Hospital. The study samples consisted of 36 patients with cancer, and the sample was selected using purposive sampling, focusing on ages 18 to 75. The instruments used were the Visual Analog Scale (VAS) for Pain levels, the Pittsburgh Sleep Quality Index (PSQI) for sleep disorders, and the Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT–F) for fatigue. Data collection was conducted through pretest and posttest questionnaires. Pain levels were measured using a Visual Analog Scale (VAS), the Pittsburgh Sleep Quality Index (PSQI) for sleep disorders, and the Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT–F) for fatigue.

The mHealth application used in this study is called Bersama Peduli, which was specifically developed to help cancer patients manage three main symptoms: pain, sleep disturbances, and fatigue. 70% of its content can be accessed offline, including educational materials, guided relaxation videos, and simple tools for symptom management. MHealth has the main features of login, home, about, how to use, online chat, education, symptom management, motivational images, and therapy MP3 videos. The audio/video therapy component included muratal (Qur'anic recitation), relaxing music, and traditional Javanese gamelan, designed to enhance emotional and spiritual comfort during use.

The intervention spanned four weeks, during which participants were directed to utilize the Bersama Peduli mHealth application daily for roughly 30 minutes. Following the intervention period, post-test data were gathered utilizing a structured questionnaire distributed through Google Forms, enabling respondents to provide their answers remotely. This approach facilitated accessibility, reduced physical interaction, and enhanced data precision. Respondent compliance was monitored through online reports within the

application. Report checks were carried out to ensure respondents followed the procedure before data analysis.

Data analysis comprised univariate and bivariate approaches, with the bivariate analysis conducted using the Wilcoxon test. This study has been approved for ethical clearance by the Ethics Committee of RSUD Dr. Moewardi Surakarta (number 2.334/IX/HREC/2024).

Figure 1. mHealth Application Login View

Figure 2. Menu View Therapy Display

Figure 3. Video and Audio

RESULTS AND DISCUSSION

Result

Table 1. Characteristics of respondents based on gender, age and education level (n=36)

Characteristics	Frequency	Percentage
Gender		
Male	17	47 %
Female	19	53 %
Age		
20 – 34 years	1	3 %
35 – 44 years	2	5 %
45 – 54 years	11	31 %
55 – 64 years	21	58 %
65 – 74 years	1	3 %
Education Level		
Primary School (SD)	23	64 %
Junior High School (SMP)	8	22 %
Senior High School (SMA)	5	14 %
Diploma/Bachelor (D3/S1)	0	-

Table 1 showed that most respondents were female, comprising 19 participants (53%). Most respondents were 55 to 64 years old, totaling 21 people (58%). The fewest were in the age ranges of 20 to 34 years and 65 to 74 years, with only one respondent (3%) in each group. The highest level of education attained was elementary school, with 23 respondents (64%), followed by junior high school, with eight respondents (22%); no respondents had a diploma or bachelor's degree.

Table 2 reveals that following the mHealth intervention, participants with no pain increased from 0 (before) to 27,8 % (after). Mild pain decreased from 83% (before) to 66,7 % (after). Moderate pain decreased from 11% (before) to 5,5 % (after). Severe pain decreased from 6% (before) to 0 (after). Good sleep quality increased from 6% (before) to 44% (after). Poor sleep quality decreased from 94% (before) to 56% (after). Fatigue decreased from 100% (before) to 83% (after). No fatigue increased from 0 (before) to 17% (after).

Table 2. Pain Level, Sleep Quality and Fatigue of Pre and Post mHealth Intervention (n=36).

Variable	Category	Pre Test n (%)	Post Test n (%)
Pain	No pain	0	10 (27,8)
	Mild pain	30 (83)	24 (66,7)
	Moderate pain	4 (11)	2 (5,5)
	Severe pain	2 (6)	0
Sleep Quality	Good	2 (6)	16 (44)
	Poor	34 (94)	20 (56)
Fatigue	Fatigue	36 (100)	30 (83)
	No fatigue	0	6 (17)

Table 3. Results of the Wilcoxon Signed-Rank Test on Pain, Sleep Quality, and Fatigue Before and After the mHealth Intervention (n=36)

Variable	Z	P-Value	CI VAS (Pain)	
VAS (Pain)				
Before Intervention	-5.416	< 0,01	1,67	2,78
After Intervention			0,80	1,81
PSQI (Sleep Quality)				
Before Intervention	-5.140	< 0,01	7,57	9,60
After Intervention			5,40	7,10
FACIT (Fatigue)				
Before Intervention	-5.245	< 0,01	12,86	15,64
After Intervention			22,25	25,58

Table 3 demonstrates that the pain scale showed a median reduction from 1,67 (CI 95%: 1,67–2,78) (before) to 0,80 (CI 95%: 0,80–1,81) (after). The statistical analysis results indicated a p-value of < 0.01 (<0.05), suggesting mHealth significantly reduced pain levels. The PSQI score showed a median reduction from 7,57 (CI 95%: 7,57–9,60) (before) to 5,40 (CI 95%: 5,40–7,10) (after). The statistical analysis results indicated a p-value of < 0.01 (<0.05), suggesting mHealth significantly increased sleep quality levels. The FACIT score showed a median increase from 12,86 (CI 95%: 12,86–15,64) (before) to 22,25 (CI 95%:22,25–25,58) (after). The statistical analysis results indicated a p-value of < 0.01 (<0.05), suggesting mHealth significantly decreased fatigue levels.

Discussion

The results indicate that cancer in halfway houses predominantly affects females. This finding corresponds with the Riskesdas report, which indicates that the prevalence of cancer is greater in women than in men (Kementerian Kesehatan Republik Indonesia, 2018). This is in line with data reported by a cancer institution, which states that one of the risk factors for cancer is increasing age. The incidence of new cancer cases is highest among the elderly (65 years and older), peaking at age 75 and above. Conversely, individuals aged 15 to 39 exhibit significantly lower incidence rates than middle-aged and older adults (Bray et al., 2024).

The data demonstrate that most of the participant's level of education attained was in elementary school. According to research conducted by Shirzadi et al. (2025), education influences the success of health interventions because individuals with higher education tend to have better health behaviors. Education influences behavior. Likewise, education is closely related to health.

The outcome illustrates that participants with no pain increased, mild, moderate, and severe pain decreased. The statistical analysis results indicated that mHealth Bersama Peduli significantly reduced pain levels. These findings are in line with previous studies on cancer patients undergoing chemotherapy, stating that pain management can be done with a mHealth approach (Maguire et al., 2021). MHealth positively reduces pain in cancer patients (Hou et al., 2020; Mehdizadeh et al., 2019). The three studies provided disease-related education, exercise and rehabilitation, emotional support, and expert consultation. This study provides educational features, online chat that allows patients to consult, symptom management, motivation, and relaxation videos. Mhealth improves pain symptom management in cancer patients.

The analysis reveals an increase in participants with good sleep quality and a decrease in those with poor sleep quality. The statistical analysis suggests that mHealth Bersama Peduli significantly enhanced sleep quality levels. These results are consistent with prior research indicating that mHealth enhances the management of sleep disorders and facilitates the monitoring and managing of patient symptoms (Rha et al., 2020). Psychological symptoms, including stress and

negative self-stigma, significantly impair patient sleep quality (Gu et al., 2024). The utilization of mobile phone interventions to mitigate sleep disorders and enhance sleep quality (Shin et al., 2017).

In addition, mHealth, with application features such as emotional support and music therapy, helps reduce anxiety and improve sleep quality (Hou et al., 2020). These features are also included in the mHealth Bersama Peduli in this study in the form of an online chat menu, encouraging images, mutual therapy, music therapy, and relaxation therapy. This study's audio therapy comprised muratal (Qur'anic recitation), instrumental relaxation music, and traditional Javanese gamelan, particularly the composition Kebo Giro, which is recognized for its soothing and repetitive rhythm—these culturally tailored attributes aimed to offer emotional and spiritual solace.

Recent research has corroborated the efficacy of gamelan therapy in enhancing psychological outcomes. For instance, gamelan Langgam Jawa has been demonstrated to alleviate anxiety in cancer patients receiving chemotherapy markedly (Sari et al., 2021), while Kebo Giro has been recognized for enhancing pain tolerance and inducing profound relaxation through its consistent rhythmic structure (Yarman et al., 2024).The incorporation of muratal has been shown to alleviate pain and anxiety in cancer patients, thereby enhancing the spiritual aspect of healing (Fujianti et al., 2023; Purnawan et al., 2021). These findings align with transcultural nursing principles and illustrate the advantages of incorporating culturally informed interventions into digital health tools.

The experimental results indicate that participants with Fatigue decreased from 100% (before) to 83% (after). No fatigue increased from 0 (before) to 17% (after). The statistical analysis results indicated a p-value of 0.000 (<0.05), suggesting mHealth Bersama Peduli significantly decreased fatigue levels. This is based on the results of previous studies, namely that mHealth can improve patient fatigue management and substantially reduce patient fatigue symptoms (Cahyono et al., 2022; Rha et al., 2020; Spahrkäs et al., 2022; Springer et al., 2024). The features such as educational content and audiovisual guides can help reduce fatigue symptoms (Cahyono et al., 2022; Hou et al., 2020).

Mhealth Bersama Peduli provides energy management for fatigue; it is in line with previous studies that show proper physical exercise management is needed to reduce the level of fatigue in patients (Marker et al., 2025). Exerciseminterventions are a workable approach to improve Cancer-Related Fatigue among (Chen et al., 2023). The three participants said that mHealth Bersama Peduli is technically easy to

access and use. It is in line with previous studies that The application's technical affordability and ease of use are very influential. MHealth is available affordably and easily accessible. The ease of the Google Play Store installation process evidences this. Data is designed 70% offline; This is consistent with previous studies, which stated that digital applications that are affordable, easy to use, and can be accessed offline are highly expected by users (Kanmodi et al., 2025).

This study's findings indicate that incorporating mHealth Bersama Peduli into nursing practice may be an accessible and effective instrument for managing intricate cancer symptoms. Consistent with Orem's Self-Care Theory, the application enables patients to perform symptom self-monitoring and proactive management, thereby improving autonomy and adherence to treatment (Chen et al., 2023; Hou et al., 2020). Furthermore, mHealth Bersama Peduli have demonstrated the ability to enhance personalized care and improve communication between patients and healthcare providers, resulting in superior health outcomes (Maguire et al., 2021). The study has limitations, including a limited sample size from a single hospital, and an absence of follow-up to evaluate long-term efficacy. Future research should incorporate larger sample sizes, multi-center trials, and extended follow-up periods to assess sustainability and generalizability. From a clinical standpoint, mHealth Bersama Peduli could be incorporated into nursing workflows to complement traditional care, especially in community-based or resource-constrained environments (Spahrkäs et al., 2022). Training nurses on digital health tools and standardized application protocols may be essential to enhance implementation and maximize patient benefits.

CONCLUSION

This study concludes that there is a significant effect of the culture-based mHealth application Bersama Peduli on pain in cancer patients. The utilization of the culture-based mHealth application in cancer patients significantly impacts sleep difficulties. The utilization of the culture-based mHealth application in cancer patients significantly impacts fatigue. This effect was observed in the context of the intervention conducted at RSUD Dr. Moewardi Surakarta Hospital.

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