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About Belitung Nursing Journal

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Online 'chatting' interviews: An acceptable method for qualitative data collection

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Abstract

Qualitative research methods allow researchers to understand the experiences of patients, nurses, and other healthcare professionals. Qualitative research also provides scientists with information about how decisions are made and the aspects of existing interventions. However, to get to obtain this important information, qualitative research requires holistic, rich, and nuanced data that can be analyzed to determine themes, categories, or emerging patterns. Generally, offline or in-person interviews, focus group discussions, and observations are three core approaches to data collection. However, geographical barriers, logistic challenges, and emergency conditions, such as the COVID-19 pandemic have necessitated the utilization of online interviews, including chatting as an alternative way of collecting data. This editorial aims to discuss the possibility of online chat interviews as an acceptable design in qualitative data collection.

Keywords

chatting; texting; messaging; data collection; online interview; qualitative research

Editorial

Data collection is the process of gathering information on variables of interest using accurate, authentic, systematic, and appropriate techniques to answer research questions, hypotheses, and desired outcomes. Rigorous data collection is essential to maintaining research integrity and scientific validity of study results (Barrett & Twycross, 2018).

Data collection methods are divided into two methods, namely secondary and primary data collection methods. Secondary data is from secondary sources, or sources not compiled directly by the researchers. The data may include published and unpublished works based on research that relies on primary sources (Rabianski, 2003). The secondary data collection method does not take long, and the resources of effort and cost are less. Secondary data is now growing as a preferred source of data for researchers due to the movement of open data science and the emergence of Open Access Initiatives (OAI). Along with open data and OAI, the accompanying policies that promote open access are an opportunity for researchers to gain access to data that may have been difficult to obtain in the past.

In contrast, primary data is real-time data, or first-hand obtained directly by researchers. This usually requires significant time, effort, and cost (Rabianski, 2003). Primary data collection methods are generally divided into quantitative and qualitative data. The quantitative data is based on mathematical calculations in various formats including inferential and descriptive statistics. The data is usually returned using a questionnaire with closed questions, which are then analyzed using the methods of correlation, regression, prediction, mean, mode, median, and other statistical methods. The other source of primary data is qualitative data, and with this type of data, mathematical calculations are not involved. Data analysis is obtained through words, sounds, feelings, emotions, body language, colors, and other elements that cannot be counted. Qualitative data collection is usually collected using interviews, focus group discussions, and observations which are the core approaches to this type of data collection (Barrett & Twycross, 2018). There are many reasons why a researcher may need quantitative or qualitative data, and this depends on the nature of the research, the concept and phenomena of interest, and the study objectives and hypothesis. Therefore, we do not need to argue if quantitative or qualitative data, secondary or primary data collection is best.

This editorial specifically discusses collecting qualitative data using the online "chatting" method. It should be noted that texting and chatting are often used interchangeably. However, there is a slight difference between the two terms. As nouns, "text" consists of various characters, glyphs, symbols, and sentences, but "chat" is an uncountable informal conversation (Wikidiff, n.d.). As verbs, "text" is sending a text message using either a short message service (SMS) or a multimedia messaging service (MMS) between two or more users via a cellular network or internet connection using mobile devices,

laptops, and other compatible computers (Wikidiff, n.d.). While "chat" is engagement in an informal conversation, or to talk lightly and casually, discuss in an easy and familiar manner, or exchange messages (Free Dictionary, 2022). Texting is part of the chatting itself (Wikidiff, n.d.). In other words, online chatting is defined as an informal conversation over the Internet that offers real-time transmission from the sender to the recipient. Chat messages are usually short so that the recipient responds quickly and is involved in the conversation (Wikipedia, 2022). In addition, chatting and instant messaging (IM) are similar, especially when using WhatsApp, Line, Messenger, or other apps. For the sake of consistency, chatting is used in this editorial.

Conversely, it should also be noted that the literature on online chatting as a qualitative data collection method is scarce and creates many contradictions because it is rarely used. Therefore, its validity and reliability are also often questioned. However, validity and reliability are not compromised when using chats for data collection, but the rationale for this method should be reasonable and justifiable. The following are reasons that can be used as references or strengths for the chatting method.

First, during the COVID-19 pandemic, the authors learned that it is tough to collect quantitative and qualitative research data, especially in social science, behavioral science, nursing science, or other disciplines related to humans. Face-to-face interviews are not possible because of the COVID-19 restrictions. This first point reflects that researchers cannot force the use of the typical data collection methods, such as face-to-face, focus groups, and direct observation. Instead, online chat interviews, or chatting, may be used as an alternative way of collecting data. It is not impossible that researchers may face situations like this pandemic again in the future, and that researchers have already prepared another way for data collection through chatting.

Second, in addition to the pandemic or emergency conditions, this chatting method is applicable for multi-settings research design. For example, it is common today to find studies conducted in various regions or comparisons in multiple countries, although they are constrained by geographical conditions. With the technology that supports internet-based chatting, researchers do not need to visit the research setting, which saves time and money (Stieger & Göritz, 2006). This provides a convenient option for researchers that eliminates barriers that create difficulties when collecting data from multiple sites across the globe.

Third, there is an argument about the use of telephone or online interviews instead of chatting. To answer this, the authors must first differentiate between telephone and online interviews. Telephone and online interviews are slightly different. Telephone/phone interviews are often conducted without being online, where researchers directly call, or voice-call research respondents through the contact number of the telephone device and mobile phone, or smartphone. Online interviews include (i) telephone/phone online interviews using voice-call features, (ii) video interviews using Zoom, Facetime, Skype, video conferencing, or other video apps, (iii) chat interviews using chat or messenger apps, and (iv) email texting. This online interview may be done formally and informally. However, email texting may not reflect a real-time conversation and take more time (Dowling, 2012). It is important to consider why researchers should use chatting instead of video or telephone interviews, and this is related to who and where, or the interview setting.

Who. Suppose researchers collect data on today's young people, or Gen Z or the internet generation. In that case, the research participants may prefer to use online interviews, especially chatting, such as using Facebook messenger, WhatsApp, Instagram, Line, WeChat, KakaoTalk, and other apps. This is to reduce the formality of the interview itself, which sometimes makes respondents afraid, reluctant, or uncomfortable to answer questions in a formal manner. Researchers will rationally choose a method that makes participants feel comfortable and free to express their ideas and perspectives without limits.

The next element to consider is, why would the researchers prefer chatting over video interviews? Based on the authors' experience in data collection, some respondents felt embarrassed to show their faces in front of the camera, were unconfident, and made the interview environment uncomfortable (Gunawan et al., 2022). Chatting was selected as a data collection technique to promote ease amongst participants. Researchers must also consider the needs and the conditions of the participants. If the participants have physical deficiencies, such as deafness, then it is not possible to conduct telephone or video interviews. Likewise, if the respondent is blind, chatting is not applicable.

Where. This is related to what applications are used, which is in accordance with the location of the target participants. For example, if the research participants are based in Indonesia, using WhatsApp is preferable (Gunawan et al., 2022). As of June 23, 2022, 148 million people in Indonesia use WhatsApp (Rizaty, 2022). WhatsApp has features for phone calls, video calls, chats, and voice delivery. Two studies (Gunawan et al., 2022; Gunawan et al., 2021) used WhatsApp in data collection, and the respondents were happy to answer questions using chat and voice recordings. However, in China, using WeChat is preferable for data retrieval (Weil et al., 2020). Both WhatsApp and WeChat have multiple features that enable options for various data collections in the form of words, chats, sounds, voices, videos, and even attached documents.

Fourth, repeated interviews are also an important factor to consider for chatting. It is not impossible that interviews need to be repeated after the initial analysis of the data. However, this often presents difficulties because it takes time to reschedule face-to-face or online phone/video interviews. Therefore, chatting is a practical and convenient solution to this problem, either to explore more data or to clarify the statements from the respondents. Based on Gunawan et al. (2022) related to research on COVID-19 vaccination, if there are two different statements from two research participants, a clarification is needed. For example, in a statement of "it is mandatory to bring a vaccine certificate to make a driver's license," one participant said yes, and the other said no. A confirmation is necessary between the two. As a result, the statement was clarified, "For those who want to make a driver's license, people who have been vaccinated would be prioritized over people who have not; but, that does not mean they are not served, only the process is slowed down" (Gunawan et al., 2022). Chatting is an opportunity to clarify with less challenges.

Fifth, the practicality and validity of the chatting data collection method are noted. Chatting is more practical than telephone/video interviews. For example, when researchers conduct telephone/video interviews, audio or video are recorded, followed by verbatim transcription before data analysis, and this process is lengthy. Bryman (2012) said that transcribing a one-hour interview takes five to six hours and is costly. While in the online chatting method, all conversations, chats, voices, and attached documents are recorded automatically in the mobile app. Researchers can access the stored archive and re-read the content. Chatting facilitates efficient use of time wherein the researchers do not transcribe verbatim or use additional staff resources to transcribe the interviews. Validity of the data is essential for the researcher, and both chatting and telephone/video interviews require a significant amount of coding amongst the various data sources, but the contents and substances between both are not different (Saarijärvi & Bratt, 2021). The interviewers' skills are needed to ask questions and receive answers according to the study purposes.

Additionally, although chatting can be considered an acceptable method for qualitative data collection, it has a weakness. For example, if the research topic or subject under study requires an in-depth interpretation technique where voice' intonation, rhythm, and volume (emotional tone), as well as body language, are necessary, then chatting is limited and may be inappropriate. However, regardless of the advantages and disadvantages of the chatting method, researchers must control the quality of the data, and this should be addressed for each individual measurement, personal observation, and the entire data set according to the aims of the study.

There are two summary points in this editorial. First, the use of the online chatting method is acceptable if the conditions for video/online interviews are not possible or desirable, either due to limited conditions in the research settings or the study subjects. Second, using chatting as an additional data collection method is suitable if it makes sense and can be accounted. The data collected from different sources in a single study may provide trustworthy findings. However, researchers cannot impose one method for data collection. Freedom and flexibility are needed to gain more understanding of the phenomenon in order to obtain holistic, rich, and nuanced data.

Declaration of Conflicting Interest

The author declares that they have no conflict of interest in this study.

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Data Availability

Not applicable.

Ethical Consideration

Not applicable.

References

Barrett, D., & Twycross, A. (2018). Data collection in qualitative research. *Evidence Based Nursing*, *21*(3), 63-64. https://doi.org/10.1136/eb-2018-102939

Bryman, A. (2012). *Social research methods* (4th ed.). Oxford: Oxford university press.

Dowling, S. (2012). Online asynchronous and face-to-face interviewing: Comparing methods for exploring women's experiences of breastfeeding long term. *Cases in Online Interview Research*, 277-296. https://dx.doi.org/10.4135/9781506335155.n11

Free Dictionary. (2022). *Chat*. https://www.thefreedictionary.com/chatting

Gunawan, J., Aungsuroch, Y., Fisher, M. L., Marzilli, C., & Sukarna, A. (2022). Identifying and understanding challenges to inform new approaches to improve vaccination rates: A qualitative study in Indonesia. *Journal of Nursing Scholarship*. https://doi.org/10.1111%2Fjnu.12793

Gunawan, J., Aungsuroch, Y., Marzilli, C., Fisher, M. L., & Sukarna, A. (2021). A phenomenological study of the lived experience of nurses in the battle of COVID-19. *Nursing Outlook*, *69*(4), 652-659. https://doi.org/10.1016/j.outlook.2021.01.020

Rabianski, J. S. (2003). Primary and secondary data: Concepts, concerns, errors, and issues. *The Appraisal Journal*, *71*(1), 43-55.

Rizaty, M. A. (2022). *WhatsApp global users touch 2.2 billion figures until first quarter 2022 [in Bahasa]*. https://databoks.katadata.co.id/datapublish/2022/06/23/pengguna-whatsapp-global-sentuh-angka-22-miliar-hingga-kuartal-i-2022

Saarijärvi, M., & Bratt, E.-L. (2021). When face-to-face interviews are not possible: Tips and tricks for video, telephone, online chat, and email interviews in qualitative research. *European Journal of Cardiovascular Nursing*, *20*(4), 392-396. https://doi.org/10.1093/eurjcn/zvab038

Stieger, S., & Göritz, A. (2006). Using Instant Messaging for Internet-based interviews. *Cyberpsychology & Behavior*, *9*, 552-559. https://doi.org/10.1089/cpb.2006.9.552

Weil, J., Karlin, N., & Lyu, Z. (2020). *Mobile messenger apps as data-collection method among older adults: WeChat in a health-related survey in the People's Republic of China*. SAGE Publication. https://doi.org/https://doi.org/10.4135/9781529707755

Wikidiff. (n.d.). *Texting vs chatting - What's the difference?* https://wikidiff.com/chatting/texting

Wikipedia. (2022). *Online chat*. https://en.wikipedia.org/wiki/Online_chat

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Oral feeding skills in premature infants: A concept analysis

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Abstract

Background: The delay in developing oral feeding skills becomes a problem experienced by premature infants. One of the reasons for the delay may be related to inconsistent definitions of oral feeding skills, which can cause discrepancies in the provision of nursing care.
Objective: This study aimed to clarify the concept of oral feeding skills in premature infants.
Methods: The Walker and Avant concept analysis method was used. A literature search was also conducted from five databases: CINAHL, PubMed, ProQuest, EMBASE, and Google Scholar, to find articles between January 2020 and December 2022.
Results: The literature search obtained 20 articles on oral feeding skills from various disciplines. Five attributes were developed from the concept analysis, including (1) coordination ability to suck, swallow, and breathe, (2) the ability to regulate oral-motor functions, (3) the ability to regulate sensory functions, (4) the ability to maintain the stability of physiology function, and (5) the ability to regulate feeding behavior. Antecedents to oral feeding skills include immaturity of the nervous system, gestational age, feeding intolerance, increased length of stay and cost of care, increased rehospitalization, stress on parents, and increased morbidity and mortality. Consequences include optimization of growth and development, reduction of length of stay and cost of hospitalization, increased bonding attachment, increased self-efficacy of parents in caring for premature infants, and improvement of the quality of life of premature infants.
Conclusion: The concept analysis provides five comprehensive attributes and their antecedents and consequences. However, this concept can be used to provide nursing care to premature infants, assess the criteria for discharge, and optimize nutrition for the growth and development of premature infants.

Keywords

concept analysis; nursing; oral feeding skills; premature infants

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Background

Premature infants are a vulnerable group with delayed development of oral feeding skills (da Rosa Pereira et al., 2020; Pados et al., 2021). The development of oral feeding skills in premature infants is a challenge for nurses and parents, and oral feeding skills are essential indicators for premature infants' discharge. Approximately 40% of premature infants have difficulty transitioning from enteral to oral feeding (da Rosa Pereira et al., 2020). A systematic study showed that premature infants still had problems with oral feeding for the first four years of life, with a prevalence of 42% (Pados et al., 2021).

Internal and external factors cause oral feeding skills problems in premature infants. Internal factors include immaturity that causes various complications such as respiratory distress syndrome, intracranial hemorrhage, and bronchopulmonary dysplasia (Chen et al., 2021). These complications disrupt the nervous system that regulates the development of oral feeding skills (Chen et al., 2021). On the other hand, external factors come from environmental exposure during treatment in intensive care. Procedures that cause pain in the oral area, such as intubation, suctioning, removing the plaster from the oral area, and inserting a tube into the stomach, provide an unpleasant negative experience in giving oral feedings to premature infants (Kamity et al., 2021).

Problems with oral feeding skills in premature infants cause the attainment of full feed feeding to be unfulfilled. It impacts growth and development delays, such as increasing stunting risk (Kamran et al., 2021). Another impact that appears includes the increased length of stay and problems in financing treatment (Chen et al., 2021). Issues with oral feeding skills can continue until post-treatment in the intensive care unit, which causes high rehospitalization rates and stress due to insufficient breast milk intake, such as hyperbilirubinemia (Azuma & Maron, 2020).

The term oral feeding skills are often used in multidisciplinary clinical practice. The terms used include oral feeding success, feeding intolerance, infant feeding

responsiveness, oral feeding readiness, oral feeding performance, feeding behavior, and oral feeding competence (Azuma & Maron, 2020). However, the definition of oral feeding skills is debatable, and some experts define oral feeding skills based on visual, sensory, and behavioral observations. In addition, several experts use a developmental approach to describe oral feeding skills, and they represent oral feeding skills as regulation and stabilization of physiological status and behavioral expression (Kamran et al., 2021).

The use of oral feeding skills in research is still not comprehensive. Some researchers use research instruments that focus on the ability of premature infants to suck, swallow, and breathe, emphasizing safety assessment when oral feeding. Practically, the research instrument still does not figure out the stages of development of oral feeding skills, such as the stages of sensory and behavioral development. As a result, it causes the research instrument to be unable to figure out valid and reliable results (Azuma & Maron, 2020).

The use of inconsistent terms impacts the inaccuracy of assessment, risk identification, implementation, and evaluation of nursing. The examples of inappropriate assessment cases of oral feeding skills at the time of discharge of premature infants may cause discrepancies in nursing interventions. Furthermore, using inappropriate terms in research will cause errors in measuring the infant's oral feeding skills variable (Girgin et al., 2021). In light of this, the concept analysis of oral feeding skills is essential to appropriately provide a clear definition in clinical practice and research. This paper will describe the conceptual analysis of premature infants' oral feeding skills using Walker and Avant (2014) 's approach.

Concept and the Aim of the Analysis

The concept of interest is the oral feeding skills of premature infants in the intensive care unit. Researchers identify, analyze, and clarify the concept more comprehensively to obtain a definition that can be applied in a more practical and holistic manner in the provision of nursing care for premature infants in intensive care rooms, such as in nursing assessments, establishing nursing diagnoses, and making nursing care plans (Walker & Avant, 2014).

All Uses of the Concept

The method in identifying the use of this concept was a literature review. The literature review aimed to analyze the use of the concept from various literature to obtain new views on premature infants feeding skills. Therefore, a literature review is essential to provide figures on the use of multidisciplinary concepts to analyze the diversity of applications using concepts from various disciplines (Walker & Avant, 2014).

The database sources used were CINAHL, PubMed, ProQuest, EMBASE, and Google Scholar. The author considered database sources to be able to explore the use of databases from various disciplines such as nursing, medical, psychology, behavioral, and social sciences. The author used the keywords "oral feeding skills" and "definition" and developed the major heading (MH) and subject heading (SH) in every search in the database. The inclusion criteria were publications in the form of journal articles from January 2020 to December 2022, in English-language journals, and full-text articles. Researchers used Walker and Avant (2014)'s approach to analyze the concept of oral feeding skills.

The selection of articles was carried out by reading the titles and abstracts. Then, articles appropriate for the concept analysis were selected based on full text. The results of the literature study obtained 20 research articles. The articles included four articles in the field of nursing, eight in the field of medical science (pediatric and neonatology), four in the field of rehabilitation and neurology, and one in the field of nutrition, psychology, physiology, and tropical disease. **Table 1** describes the definition of the concept of oral feeding skills.

Defining Attributes

At this stage, the researchers identified the characteristics of the concept repeatedly. Next, the researchers classify keywords with the same meaning into keyword clusters. Finally, the researchers gave names or labels to keyword clusters so that attributes were obtained to clarify the definition of the oral feeding skills concept (Walker & Avant, 2014). At this stage, the researchers developed five attributes of oral feeding skills, including (1) the ability to coordinate sucking, swallowing, and breathing, (2) the ability to regulate oral-motor functions, (3) the ability to regulate sensory function, (4) the ability to maintain the stability of psychology, (5) and the ability to regulate the feeding behavior of premature infants. The operational definition of oral feeding skills is the infant's ability to coordinate sucking, swallowing, and breathing; regulation of oral-motor function; regulation of sensory function, maintain psychological stability; and regulation of feeding behavior to caregivers or the environment to fulfill nutrition needs. **Table 2** describes the steps for defining attributes.

The first attribute of coordinated sucking, swallowing, and breathing is described as regulating the contraction and relaxation of the esophagus, as well as the complex interactions of the gastrointestinal, cardiorespiratory, and nervous systems. The ability to swallow in infants develops from 12 to 14 weeks of gestation, while the ability to suck develops at 14 weeks of pregnancy. The ability to coordinate sucking-swallowing-breathing is achieved at 34 weeks of gestation. Sucking-swallowing-breathing coordination ability will impact a safe oral feeding process, and no aspiration occurs (Chen et al., 2021).

The second attribute is the ability to regulate oral-motor function. This attribute is a complex process of the musculoskeletal system through the synchronous movement of the oral area. The ability of this oral-motor function is shown by the infants opening the mouth, positioning the tongue, and maintaining the neck and head posture. This attribute is the result of the interaction between the central nervous system and the musculoskeletal system. The maturation of both systems affects the success of oral feeding (Brantes et al., 2021).

The third attribute is the ability to regulate sensory functions. This ability responds to olfactory, auditory, vestibular, and kinesthetic sensations. For example, the ability of this attribute is the positive response of premature infants to the olfactory stimuli of the smell of breast milk and the mother's

voice, as well as the infant's response to the kinesthetic stimuli of the mother's touch. The ability to regulate sensory function results from neurodevelopmental development (Sasmal & Shetty, 2021).

The fourth attribute of the ability to regulate the stability of physiological status is the ability to prevent airway disorders such as aspiration and minimize energy expenditure. The ability on this attribute is related to the attribute of sucking-swallowing-breathing coordination ability. Success in this ability is indicated by the stability of oxygenation, minimal energy expenditure, and the absence of fatigue (Sasmal & Shetty, 2021).

The fifth attribute is the ability to regulate feeding behavior, namely providing feeding cues to caregivers or the environment. The process of oral feeding is the infant's interaction with caregivers or the environment. Infants give feed cues, while caregivers or the environment recognize these cues. Infants with oral feeding readiness show active cues are awake, focus attention on the environment and make eye contact with caregivers (Azuma & Maron, 2020).

Table 1 Concept definitions of oral feeding skills based on literature review (*n* = 20 articles)

No	Authors	Field	Definition
1.	Brantes et al. (2021)	Nursing	The skills to regulate and coordinate complex processes, including the role of physiologists, behavioral regulation, oral-motor regulation, and sucking, swallowing, and breathing coordination to meet nutritional needs.
2.	Samane et al. (2022)	Nursing	The skills to give cues to the infants feeding behavior to the environment or caregivers so that self-regulation is formed to maintain the stability of the physiological coordination of breathing, sucking, and breathing.
3.	Girgin et al. (2021)	Nursing	The complex interactions between the gastrointestinal, cardiorespiratory, and nervous systems result in oral-motor coordination.
4.	Sasmal and Shetty (2021)	Nursing	The skills to coordinate sucking-swallowing-breathing, prevent desaturation episodes, and minimize energy expenditure.
5.	Viswanathan and Jadcherla (2020)	Neonatology	Propelling milk from the mouth to the stomach involves a complex coordination of sucking-swallowing-breathing, regulating a relaxation and contraction rhythm between the upper and lower esophageal sphincter (UES, LES).
6.	Putnick et al. (2022)	Pediatric	Complex activities that require coordination of oral-motor, neurological (gives hunger cues), gastrointestinal, cognitive (sensory perception responses), and social cues.
7.	Zinoni et al. (2021)	Neonatology	The skills to suck feeding volume and prevent apnea and desaturation from occurring.
8.	Azuma and Maron (2020)	Neonatology	Complex developmental stages that require integrating sensory inputs such as sound, smell, and touch involve maturation of motor coordination and stabilization of the respiratory system.
9.	Patton et al. (2022)	Pediatric	The skills to fulfill nutrition needs for growth and development include meeting the needs of energy, protein, fat, and carbohydrates and reducing the occurrence of intolerance to feedings, such as desaturation and bradycardia during feeding, preventing food penetration into the lungs.
10.	Li et al. (2021)	Neonatology	The complex processes of the sensory and motor systems that are influenced by many factors.
11.	Majoli et al. (2021)	Neonatology	Oral feeding skills are the ability to coordinate sucking-swallowing- breathing.
12.	Kamity et al. (2021)	Neonatology	The skills to swallow begin with swallowing a bolus of food and end in the stomach, as a result of coordinating the functions of sucking, swallowing, respiration, and maintaining the airway and neurological control.
13.	Chen et al. (2021)	Medical Rehabilitation	Complex skills become the integration of sucking, swallowing, and breathing.
14.	Widman-Valencia et al. (2021)	Neurologist	The complex process is coordinated bilateral contraction and relaxation of muscles in the mouth, tongue, larynx, pharynx, and esophagus.
15.	Pineda et al. (2020)	Occupational Therapy	Behavioral response with coordination between sucking patterns, protecting the airway during swallowing.
16.	Ostadi et al. (2021)	Speech Therapy	Skills resulted from developing oral-motor skills, maintaining posture, and coordinating sucking, swallowing, and breathing.
17.	Philippe et al. (2022)	Nutrition	Oral feeding skills provide optimal nutrition by creating an environment that supports the skills to stimulate behaviors that support feeding behaviors and practices by involving the role of parents.
18.	Elsewadi et al. (2022)	Physiology	The skills to coordinate between swallowing, sucking, and breathing.
19.	Segala et al. (2022)	Psychology	Oral feeding skills regulate oral, auditory, vestibular, and kinesthetic sensations associated with stimuli to achieve a safe feeding experience.
20.	Gu et al. (2022)	Tropical Disease	The regulation of feeding behavior and physiology are influenced by the olfactory system, namely odorant receptors (ORs), odorant-binding proteins (OBPs), and odorant-degrading enzymes (ODEs).

Model Case

Nurse M, who works in the intensive care unit, gave oral breast milk through a bottle to Baby A. Baby A was 34 weeks gestation, six days old, and had a birth weight of 1,460 grams. Nurse M observed awake status before giving oral fluids. Baby A appeared to be active, opened his eyes, and made eye contact. Nurse M then stimulated placing the tip of the bottle in the corner of the baby's left lip. Baby A seemed to turn to the left and look for the food sources. Baby A then opened the

mouth, pressed the lips and tongue against the jaw, maintained the stability of the head and neck muscles, and positioned the baby inflexion. Baby A seems to maintain a regular rhythm of sucking and feeding breast milk, there was a swallowing milk sound, and there was no hiccup sound. During feeding, Baby A did not appear tired; there was no cyanosis or apnea. The monitor showed a respiratory rate of 48 beats per minute, a heart rate of 148 beats per minute, and an oxygen saturation of 98%. Baby A fell asleep after being given breast milk.

The model case illustrates all the attributes of the concept of oral feeding skills as Walker and Avant (2014) claimed that the model case contains all attributes analyzed. The first attribute, the ability to coordinate sucking-swallowing-breathing, was shown in the case of maintaining sucking rhythm, no hiccup sounds, and no cyanosis and apnea. The second attribute was the ability to regulate oral-motor functions; namely, the baby opened the mouth, pressed the lips, the tongue was in the opposite direction of the jaw, maintained the stability of the head and neck muscles, and flexed posture. The third attribute was the ability to regulate sensory functions. For example, the baby responds to the stimulus when the nurse performs tactile stimulation and the smell of milk at the corner of the baby's lips. The fourth attribute, the ability to maintain the stability of the function of physiologists, was characterized by respiratory rate, heart rate, and oxygen saturation within normal limits. The fifth attribute was the regulation of feeding behavior when the nurse conducts an awake status assessment which shows the baby was active, opened his eyes, made eye contact with the caregiver, and the baby fell asleep after the feeding needs were fulfilled.

Table 2 Keywords cluster in defining attributes

Keywords Cluster	Sources	Attribute
○ Coordination of sucking, swallowing, and breathing ○ The complex interaction of the gastrointestinal, cardiorespiratory, and nervous systems. ○ Regulating the rhythm of relaxation between the upper and lower esophageal sphincters, contraction of the esophagus	Brantes et al. (2021); Chen et al. (2021); Elsewadi et al. (2022); Girgin et al. (2021); Kamity et al. (2021); Majoli et al. (2021); Ostadi et al. (2021); Pineda et al. (2020); Samane et al. (2022); Sasmal and Shetty (2021); Viswanathan and Jadcherla (2020); Zinoni et al. (2021)	The ability to coordinate sucking-swallowing-breathing
○ Oral-motor regulation ○ Maintaining posture ○ Oral-motor skills ○ Complex processes of the musculoskeletal system ○ Bilateral coordination of muscle contraction and relaxation ○ Maturation of motor coordination	Azuma and Maron (2020); Brantes et al. (2021); Girgin et al. (2021); Li et al. (2021); Ostadi et al. (2021); Putnick et al. (2022); Segala et al. (2022); Widman-Valencia et al. (2021)	The ability to organize oral-motor functioning
○ Olfactory system regulation ○ Response receptors (odorant receptors/ORs), Odorant-binding proteins (OBPs), Odorant-degrading enzymes (ODEs) ○ Sensory perception response ○ Integration of sensory input of sound, smell, and touch ○ Regulation of auditory, vestibular, and kinesthetic sensation	Azuma and Maron (2020); Gu et al. (2022); Li et al. (2021); Putnick et al. (2022); Segala et al. (2022)	The ability to organize sensory functioning
○ Physiological stability ○ Preventing desaturation and bradycardia ○ Preventing food penetration into the lungs ○ Preventing aspiration ○ Minimizing energy expenditure	Azuma and Maron (2020); Brantes et al. (2021); Gu et al. (2022); Patton et al. (2022); Samane et al. (2022); Sasmal and Shetty (2021); Zinoni et al. (2021)	The ability to maintain physiologic stability
○ Infants feeding behavior cues ○ Regulation of feeding behavior ○ Supporting feeding behavior ○ Social cues ○ Self-regulation	Brantes et al. (2021); Gu et al. (2022); Philippe et al. (2022); Pineda et al. (2020); Putnick et al. (2022); Samane et al. (2022)	The ability to organize behavioral cue

Additional Cases

Borderline Case

Baby A has a gestational age of 34 weeks, chronological age of 6 days, and a birth weight of 1,460 grams, was currently being given oral feedings. Nurse M gave the Mother of Baby A an educational program from the beginning of care. Mother of Baby A was given education about the introduction of baby feeding cues, such as recognizing the baby's awake status, how to breastfeed, and recognizing signs of aspiration when feeding. Every day Mother of Baby A performed maternal therapeutic touch and maternal voice stimulus before starting breastfeeding exercises. Mother of Baby A routinely cares for the Kangaroo Mother Care (KMC). Baby A's care room was subject to environmental settings such as noise and lighting. At the time of the assessment before discharge, the mother was able to breastfeed, the baby's sucking reflex was strong, the weight had increased, and the baby had reached full feed.

Contrary Case

Baby A has a gestational age of 34 weeks, a chronological age of 6 days, and a birth weight of 1,460 grams. There was no structured educational program during caring, and educational programs were provided shortly before discharge. Mother of

Baby A rarely visited and interacted with Baby A. Mother of Baby A had not performed KMC regularly. Baby A was cared for in an uncovered incubator and did not use nesting. At the time of the assessment before discharge, the mother had not been able to breastfeed and felt unable to care for the baby at home, the baby's suction reflex was weak, and the target for weight gain had not been reached.

A borderline case is illustrated as the concept analysis by loading the time and intensity of an event (Walker & Avant, 2014). In the borderline case, the health education intervention contained attributes the ability to coordinate sucking-swallowing-breathing, regulate feeding cues, and regulate physiological functions. The attributes of the ability to regulate sensory functions are figured Stimulation of Maternal therapeutic Touch, Maternal Voice Stimulus, KMC, and environmental regulation. On the contrary case, the figure did not show the attributes of the formulated concept. The impact of the absence of these attributes, among others, the mothers had not been able to breastfeed and felt unable to care for the baby at home, the baby's sucking reflex was weak, and the target of weight gain had not been achieved.

Antecedents

The antecedent is the event that occurs before the concept happens. An example of the antecedents of oral feeding skills is immaturity in premature infants (Walker & Avant, 2014). The antecedent concept of oral feeding skills of premature infants is influenced by gestational age and maturity of the nervous system, such as reflex development (Kamran et al., 2021). The delay in oral feeding skills in premature infants may cause malnutrition, aspiration pneumonia, and feeding intolerance that can increase the morbidity and mortality of premature infants (Chen et al., 2021). In addition, the delay in developing oral feeding skills increases the length of hospitalization, problems in financing treatment, high rates of rehospitalization, and stress on parents (Azuma & Maron, 2020) (**Figure 1**).

Consequences

Consequences are the events resulting from the concept (Walker & Avant, 2014). The literature review results stated that the oral feeding skill intervention impacted the development and growth of premature infants (da Rosa Pereira et al., 2020; Soleimani et al., 2020). Samane et al. (2022) conducted a study on the attributes of the regulation of feeding behavior, namely the cue-based feeding educational intervention. The results showed that the intervention improved the attainment of full feed and reduced the length of hospitalization and cost of care. Fontana et al. (2018) conducted a study on the attributes of sensory function regulation with the KMC intervention, visual stimulation with the mother's facial recognition, and tactile stimulation with the massage. This study proved an increase in maternal self-efficacy in caring for premature infants and the formation of mother-infant bonding attachments (**Figure 1**).

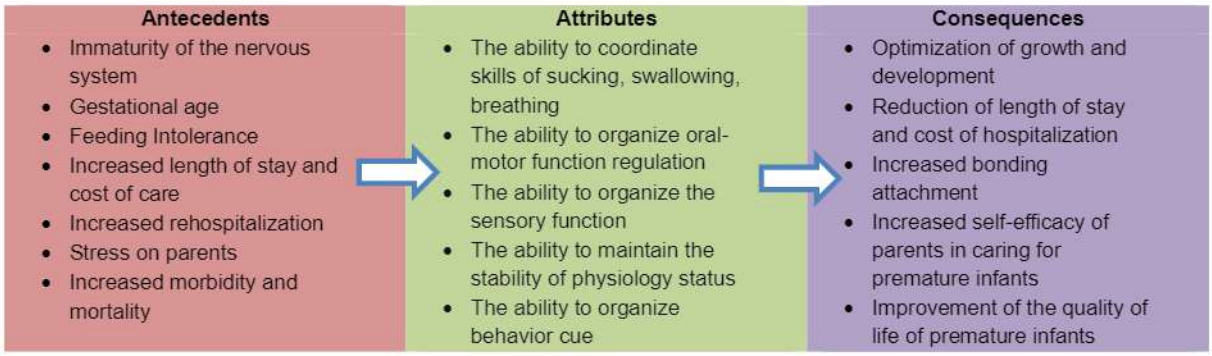

Figure 1 Antecedents, attributes, and consequences of oral feeding skills

Defining Empirical Referents

Empirical referents classify classes, categories, or actual phenomena by demonstrating the other concepts (Walker & Avant, 2014). The use of attributes for regulating sucking-swallowing-breathing coordination, the ability to regulate oral-motor functions, and the ability to control the stability function of physiology are found on the instruments of The Early Feeding Skills Assessment (EFS) (Kamity et al., 2021), Oral Feeding Quality scale (OFQS) (Kamran et al., 2021), and Neonatal Oral Motor Assessment Scale (NOMAS) (Kamran et al., 2021). EFS is an instrument to measure oral readiness to feed. NOMAS and OFQS are instruments that assess oral feeding skills that focus on evaluating the suction reflex. Attributes of the ability to regulate feeding behavior and sensory control functions are found on the instrument, the Oral Feeding Readiness scale (OFRS) (Kamran et al., 2021). The use of instruments can assess the safety and development function appropriately. However, it is recommended for all existing instruments to include all five attributes developed in this study for assessing premature infants' oral feeding skills.

Implications for Nursing Practice

The concept analysis of oral feeding skills in premature infants resulted in five extended attributes. The five attributes describe the assessment of the concept of oral feeding skills both visually, sensory, physiologically, and feeding behavior. Attributes of the ability to regulate oral-motor function and suck-swallow-breath coordination are visually assessed. The attribute of the ability to control sensory functions describes the sensory assessment of concepts, while the attribute of the ability to regulate feeding cues behavior describes an evaluation of the behavioral development of premature infants.

The five attributes also illustrate the regulation of physiological functions, feeding safety, and behavioral expression. However, the results of this concept analysis answer the gap in oral feeding skills that is still a debate between visual, sensory, and behavioral assessments (Kamran et al., 2021).

The implications of the oral feeding skills analysis in premature infants have implications for clinical nursing practice, especially neonatology nursing, that the concept of oral feeding skills is comprehensive in terms of visual, sensory, and behavioral assessments. This concept is necessary for providing nursing care to premature infants, for nursing practice in assessing the criteria for returning premature infants, and for optimizing nutrition that has a long-term impact on the growth and development of premature infants (Azuma & Maron, 2020).

Conclusion

The concept analysis resulted in five attributes of oral feeding skills in premature infants: the ability to coordinate sucking, swallowing, and breathing; the ability to regulate oral-motor functions; the ability to control sensory functions; the ability to maintain the stability of physiological functions; and the ability to regulate feeding behavior. This comprehensive and holistic concept analysis can be used in the clinical practice of providing nursing care, for instance, applying the five attributes in assessing oral feeding skills as criteria for the discharge of premature infants. The study results can also be used to evaluate the existing instruments to better assess the development of premature infant oral feeding skills.

Declaration of Conflicting Interest

There are no conflicts of interest in this study.

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Authors' Contributions

DDA conceptualized, designed, analyzed, and drafted the manuscript. YR and DW contributed to conceptualizing, analyzing, reviewing, and supporting concepts with intellectual content. All authors provided final approval of the version to be published.

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Data Availability

Not Applicable.

Ethical Consideration

Not applicable.

References

Azuma, D., & Maron, J. L. (2020). Individualizing oral feeding assessment and therapies in the newborn. *Research and Reports in Neonatology*, *10*, 23-30. https://doi.org/10.2147/RRN.S223472

Brantes, A. L. G., dos Santos Curado, M. A., & Cruz, I. R. (2021). Feeding methods in promoting the oral motor skills of the preterm newborn: A scoping review. *Enfermería Global*, *20*(1), 521-535. https://doi.org/10.6018/eglobal.410411

Chen, D., Yang, Z., Chen, C., & Wang, P. (2021). Effect of oral motor intervention on oral feeding in preterm infants: A systematic review and meta-analysis. *American Journal of Speech-Language Pathology*, *30*(5), 2318-2328. https://doi.org/10.1044/2021_AJSLP-20-00322

da Rosa Pereira, K., Levy, D. S., Procianoy, R. S., & Silveira, R. C. (2020). Impact of a pre-feeding oral stimulation program on first feed attempt in preterm infants: Double-blind controlled clinical trial. *PloS One*, *15*(9), e0237915. https://doi.org/10.1371/journal.pone.0237915

Elsewadi, B. F., Samson, N., Nadeau, C., Vanhaverbeke, K., Nguyen, N., Alain, C., Fortin-Pellerin, É., & Praud, J.-P. (2022). Safety of bottle-feeding under nasal respiratory support in preterm lambs with and without tachypnoea. *Frontiers in Physiology*, *12*, 785086. https://doi.org/10.3389/fphys.2021.785086

Fontana, C., Menis, C., Pesenti, N., Passera, S., Liotto, N., Mosca, F., Roggero, P., & Fumagalli, M. (2018). Effects of early intervention on feeding behavior in preterm infants: A randomized controlled trial. *Early Human Development*, *121*, 15-20. https://doi.org/10.1016/j.earlhumdev.2018.04.016

Girgin, B. A., Gözen, D., Uslubaş, R., & Bilgin, L. (2021). The evaluation of oral feeding in preterm infants: Turkish validation of the Early Feeding Skills Assessment tool. *Turkish Archives of Pediatrics*, *56*(5), 440-446. https://doi.org/10.5152%2FTurkArchPediatr.2021.21008

Gu, Z.-y., Gao, H.-t., Yang, Q.-j., Ni, M., Li, M.-j., Xing, D., Zhao, T.-y., Zhao, T., & Li, C.-x. (2022). Screening of olfactory genes related to blood-feeding behaviors in Culex pipiens quinquefasciatus and Culex pipiens molestus by transcriptome analysis. *PLoS Neglected Tropical Diseases*, *16*(2), e0010204. https://doi.org/10.1371/journal.pntd.0010204

Kamity, R., Kapavarapu, P. K., & Chandel, A. (2021). Feeding problems and long-term outcomes in preterm infants—A systematic approach to evaluation and management. *Children*, *8*(12), 1158. https://doi.org/10.3390/children8121158

Kamran, F., Sagheb, S., Khatoonabadi, S. A., Ebadi, A., Faryadras, Y., & Aghajanzadeh, M. (2021). The validity and reliability of early feeding skills assessment and cue-based feeding scales for preterm infants. *Middle East Journal of Rehabilitation and Health Studies*, *8*(3), e110973. https://doi.org/10.5812/mejrh.110973

Li, L., Wang, L., Niu, C., Liu, C., Lv, T., Ji, F., Yu, L., Yan, W., Dou, Y. L., & Wang, Y. (2021). Early skin contact combined with mother's breastfeeding to shorten the process of premature infants≤ 30 weeks of gestation to achieve full oral feeding: the study protocol of a randomized controlled trial. *Trials*, *22*(1), 1-10. https://doi.org/10.1186/s13063-021-05605-x

Majoli, M., Artuso, I., Serveli, S., Panella, M., Calevo, M. G., & Antonio Ramenghi, L. (2021). A key developmental step for preterm babies: Achievement of full oral feeding. *The Journal of Maternal-Fetal & Neonatal Medicine*, *34*(4), 519-525. https://doi.org/10.1080/14767058.2019.1610733

Ostadi, M., Armanian, A.-M., Namnabati, M., Kazemi, Y., & Poorjavad, M. (2021). The effects of swallowing exercise and non-nutritive sucking exercise on oral feeding readiness in preterm infants: A randomized controlled trial. *International Journal of Pediatric Otorhinolaryngology*, *142*, 110602. https://doi.org/10.1016/j.ijporl.2020.110602

Pados, B. F., Hill, R. R., Yamasaki, J. T., Litt, J. S., & Lee, C. S. (2021). Prevalence of problematic feeding in young children born prematurely: A meta-analysis. *BMC Pediatrics*, *21*(1), 1-15. https://doi.org/10.1186/s12887-021-02574-7

Patton, L., de la Cruz, D., & Neu, J. (2022). Gastrointestinal and feeding issues for infants< 25 weeks of gestation. *Seminars in Perinatology*, *46*(1), 151546. https://doi.org/10.1016/j.semperi.2021.151546

Philippe, K., Chabanet, C., Issanchou, S., Grønhøj, A., Aschemann-Witzel, J., & Monnery-Patris, S. (2022). Parental feeding practices and parental involvement in child feeding in Denmark: Gender differences and predictors. *Appetite*, *170*, 105876. https://doi.org/10.1016/j.appet.2021.105876

Pineda, R., Prince, D., Reynolds, J., Grabill, M., & Smith, J. (2020). Preterm infant feeding performance at term equivalent age differs from that of full-term infants. *Journal of Perinatology*, *40*(4), 646-654. https://doi.org/10.1038/s41372-020-0616-2

Putnick, D. L., Bell, E. M., Ghassabian, A., Robinson, S. L., Sundaram, R., & Yeung, E. (2022). Feeding problems as an indicator of developmental delay in early childhood. *The Journal of Pediatrics*, *242*, 184-191. https://doi.org/10.1016/j.jpeds.2021.11.010

Samane, S., Yadollah, Z. P., Marzieh, H., Karimollah, H.-T., Reza, Z. M., Afsaneh, A., & Als, H. (2022). Cue-based feeding and short-term health outcomes of premature infants in newborn intensive care units: A non-randomized trial. *BMC Pediatrics*, *22*(1), 1-8. https://doi.org/10.1186/s12887-021-03077-1

Sasmal, S., & Shetty, A. P. (2021). Systematic review protocol examining the effect of prefeeding oromotor stimulation on preterm neonate's feeding outcomes. *Manipal Journal of Nursing and Health Sciences*, *7*(1), 3.

Segala, F., Bolzan, G. d. P., Nascimento, M. D., Gonçalves, D. d. S., Melchior, A., Moraes, M. V. M. d., & Weinmann, A. R. M. (2022). Influence of taste stimulation on sucking pressure in newborn infants at term. *CoDAS*, *34*(3), e20210002. https://doi.org/10.1590/2317-1782/20212021002

Soleimani, F., Azari, N., Ghiasvand, H., Shahrokhi, A., Rahmani, N., & Fatollahierad, S. (2020). Do NICU developmental care improve cognitive and motor outcomes for preterm infants? A systematic review and meta-analysis. *BMC Pediatrics*, *20*(1), 1-16. https://doi.org/10.1186/s12887-020-1953-1

Viswanathan, S., & Jadcherla, S. (2020). Feeding and swallowing difficulties in neonates: Developmental physiology and pathophysiology. *Clinics in Perinatology*, *47*(2), 223-241. https://doi.org/10.1016/j.clp.2020.02.005

Walker, L. O., & Avant, K. C. (2014). *Strategies for theory construction in nursing* (5th ed.). London: Pearson.

Widman-Valencia, M. E., Gongora-Meza, L. F., Rubio-Zapata, H., Zapata-Vázquez, R. E., Lizama, E. V., Salomón, M. R., & Estrella-Castillo, D. (2021). Oral motor treatment efficacy: Feeding and swallowing skills in children with cerebral palsy. *Behavioural Neurology*, *2021*, 6299462 https://doi.org/10.1155/2021/6299462

Zinoni, M. M., Herrero, L. C., Lamuño, D. G., & de las Cuevas Terána, I. (2021). Translation and study of the measurement properties of the Early Feeding Skills Assessment tool in premature newborn. *Anales de Pediatría (English Edition)*, *95*(2), 72-77. https://doi.org/10.1016/j.anpede.2020.05.018

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A comprehensive discharge planning program on fatigue and functional status of patients with hepatocellular carcinoma undergoing transarterial chemoembolization: A randomized clinical controlled trial

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Abstract

Background: Post transarterial chemoembolization (post-TACE) causes side effects that impact patients, which leads to fatigue symptoms and reduced functional status. However, unrelieved fatigue and reduced functional status may cause patients to withdraw from treatment and negatively affect their lives. Unfortunately, the patients post-TACE only receive routine medical care at the hospital but no follow-up and continuity of care back home. Therefore, comprehensive discharge planning for these problems is necessary.

Objective: This study examined the effectiveness of the comprehensive discharge planning program on fatigue and functional status of patients with hepatocellular carcinoma undergoing transarterial chemoembolization.

Methods: A randomized clinical controlled trial was used. Fifty-two patients who met the study criteria were randomly assigned to an experimental group (n = 26) receiving the comprehensive discharge planning plus routine care and a control group (n = 26) receiving routine care only. The discharge planning program was developed based on the Transitional Care Model. A demographic and health data questionnaire, Fatigue Severity Scale (FSS), and Enforced Social Dependency Scale (ESDS) were used for data collection. Chi-square, Fisher's exact, Wilcoxon signed-rank, and Mann-Whitney U tests were used for data analysis.

Results: The mean scores for fatigue at 30 days after treatment between the experimental and control groups were significantly different (p = 0.003). The mean scores for the fatigue symptoms in the experimental and control groups were 1.27 ± 0.58 and 1.77 ± 0.85, respectively. The functional status from Day 7 to Day 14 after transarterial chemoembolization was different (p = 0.020). In addition, the mean scores for functional status between the experimental and control groups were significantly different (p = 0.020). On Day 14, after transarterial chemoembolization, the experimental group had an increased score in functional status from Day 7 over the scores for those in the control group.

Conclusion: The comprehensive discharge planning program effectively reduces fatigue symptoms and enhances the functional status in patients with hepatocellular carcinoma undergoing transarterial chemoembolization. Therefore, the comprehensive discharge planning program can be used by nurses and multidisciplinary teams in order to achieve the effectiveness of nursing care for patients.

Keywords

discharge planning; transarterial chemoembolization; hepatocellular carcinoma; fatigue; functional status; nursing

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Background

Cancer is a serious non-communicable disease that is a major problem worldwide, including in Thailand. It is the leading cause of death in Thailand, where as many as 130,000 new patients with cancer are diagnosed yearly (Fongchan et al., 2019). Liver cancer is the third leading cancer in terms of worldwide cancer deaths (Kitiyakara, 2018). Up to 80% of all liver cancer cases worldwide are found in Asia (Vilaichone, 2009). According to data from the World Health Organization (WHO) and the International Agency for Research on Cancer, the likelihood of discovering cancer is 7.9% in males, making

it the fifth leading type of cancer (Thai Association for the Study of the Liver, 2015) with three to four times higher prevalence in males than females. In addition, the leading cause of death from cancer in both genders is liver cancer.

Available treatment options for liver cancer include surgical removal of the cancerous tumors, liver transplant, localized destruction of the cancer cells, transarterial chemoembolization (TACE), and palliative care. However, most patients receive the diagnosis after the cancer has metastasized. As a result, the first treatment option for liver cancer is TACE, which increases the survival rate from 10% to 40-50%, covering a period of about 14-20 years (Cabrera & Nelson, 2010).

The side effects of post-TACE cause patients to encounter at least one symptom that impacts them physically, psychologically, emotionally, and socially. Single or multiple symptoms such as abdominal pain and fatigue might occur concurrently. Regardless of the number of symptoms, however, when a single symptom occurs, additional symptoms can follow, and they are interrelated (Cao et al., 2013). If patients experience increased symptom severity or longer symptom duration, various impacts will also increase in severity (Lenz & Pugh, 2018). Suwisith et al. (2008) found that fatigue is the most influential symptom in a person's daily activities in terms of symptom severity and distress. In addition, Luciani et al. (2008) stated that fatigue is correlated with the activities of daily living, and fatigue in liver cancer patients that have undergone TACE causes more significant disruption to the activities of daily living than before treatment (Cao et al., 2013).

Fatigue is a symptom that persons perceive as physical and psychological abnormalities. The person perceives tiredness, suffering, loss of energy, and weakness. These individual emotional and cognitive perceptions impact the individual's function and quality of life (National Comprehensive Cancer Network, 2020). Shun et al. (2012) found that fatigue is the leading symptom encountered in patients with hepatocellular carcinoma post-TACE. Fatigue negatively impacts the quality of life (Shun et al., 2008; Sun & Sarna, 2008) and reduces the function status (Khamboon, 2014). In addition, fatigue is the number-one symptom in patients with liver cancer who have undergone TACE and persists even after 4 to 8 weeks post-treatment. Studies have found that fatigue contributes to insomnia, physical weakness, tiredness, and reduces appetite and that all of these symptoms are interrelated, contributing to the premature hospital visits of patients and seriously impacting their quality of life (Li et al., 2015; Nillert et al., 2019; Shun et al., 2012). Thus, fatigue is an influential factor associated with the health status and quality of life of patients post-TACE (Gupta et al., 2007).

Furthermore, fatigue symptoms are the most severe in the 48 hours after treatment (Barsevick et al., 2004; Cao et al., 2013) in 96% of cases. Furthermore, treatment-caused fatigue is also linked to the creation of inflammation such as neopterin, interleukin-1 receptor antagonist, etc. It has been found that fatigue plans for patients with liver cancer treated by TACE are the same plans used for patients with breast cancer that have received chemotherapy (Shun et al., 2005). Studies also have found that the severity of fatigue does not vary among chemotherapy sessions 1-3 (Berger, 1998; Donovan et al., 2004; Greene et al., 1994). However, unrelieved fatigue and reduced functional status may cause patients to withdraw from treatment and negatively impact their lives.

A literature review revealed that preparations for discharge could help patients manage side effects and symptoms that may occur and perform their daily activities by themselves according to their health status (Lan et al., 2015; Salah et al., 2012). It is a process carried out by health professional teams participating in care and continuously meeting the care needs of patients. This process includes transitional care of patients from hospital to home and reciprocal and continuous monitoring to prevent rehospitalization and premature hospital visits while saving treatment expenses. Lan et al. (2015) found that discharge planning can help patients achieve effective self-care and effectively manage side effects in reducing fatigue and depression in liver cancer patients that have received TACE treatment.

The patients during post-TACE have to face unrelieved fatigue and reduced functional status. In addition, the patients only receive routine medical care at the hospital but no follow-up and continuity of care back home. Therefore, this study aimed to determine the effects of a program for comprehensive discharge planning conceptualized by Naylor's transition care model (Naylor et al., 2004) to help the group mentioned above manage their fatigue and effectively improve their functional status in order to achieve maximum health status.

Naylor et al. (2018) developed the Transitional Care Model (TCM) to improve the care and patient outcomes for people at risk for poor results during the transition period. The TCM is used as a model of care designed to provide comprehensive discharge planning and continuing care, such as patient education, skills training, telephone follow-ups, and home visits (Albert et al., 2015). The comprehensive discharge planning program conceptualized by TCM focuses on nurse-led and interdisciplinary team interventions transferring patients at each stage to facilitate continuous care tailored to the patient's needs, including the provision of knowledge about illness, treatment, and complication information and fatigue and functional status management. The aim of the study was to investigate the effects of a comprehensive discharge planning program for patients with hepatocellular carcinoma undergoing TACE treatment on their fatigue and functional status post-TACE treatment.

Methods

Study Design

A randomized clinical trial research design was used. The study was conducted from January 2020 to September 2020. The CONSORT (Consolidated Standards of Reporting Trials) checklist (Moher et al., 2010) was used to report the study.

Samples/Participants

The participants in this study were male and female patients with liver cancer aged 18 years and up post-TACE treatment who received arterial chemotherapy at a vascular interventional radiology department, diagnostic radiology, and nuclear medicine unit in a university hospital in Bangkok. The inclusion criteria consisted of patients who could perceive, understand, and communicate in Thai and use a telephone. Exclusion criteria included patients with the end-stage disease

(BCLC D) and an ECOG score (Eastern Cooperative Oncology Group) greater than two or post combined TACE and RFA (radiofrequency ablation) treatment or already diagnosed with a psychiatric disorder, such as depression or a cognitive disorder. The researchers used the Thai Mental State Examination (TMSE) to evaluate candidates older than 60. If any candidate scored less than or equal to 23, they might have had cognitive deficiencies that would cause them to be excluded from the study.

The sample size was calculated using G*Power analysis, with a power of 0.80, α = 0.05, and effect size of 0.86, according to Lan et al. (2015). The results indicated that the study needed 23 samples per group. In order to prevent sample loss, the researchers added an attrition rate of 10%. Therefore, the number of participants was 26 in each group. The researchers randomly assigned samples to the control and experimental groups using simple computerized randomization (**Figure 1**).

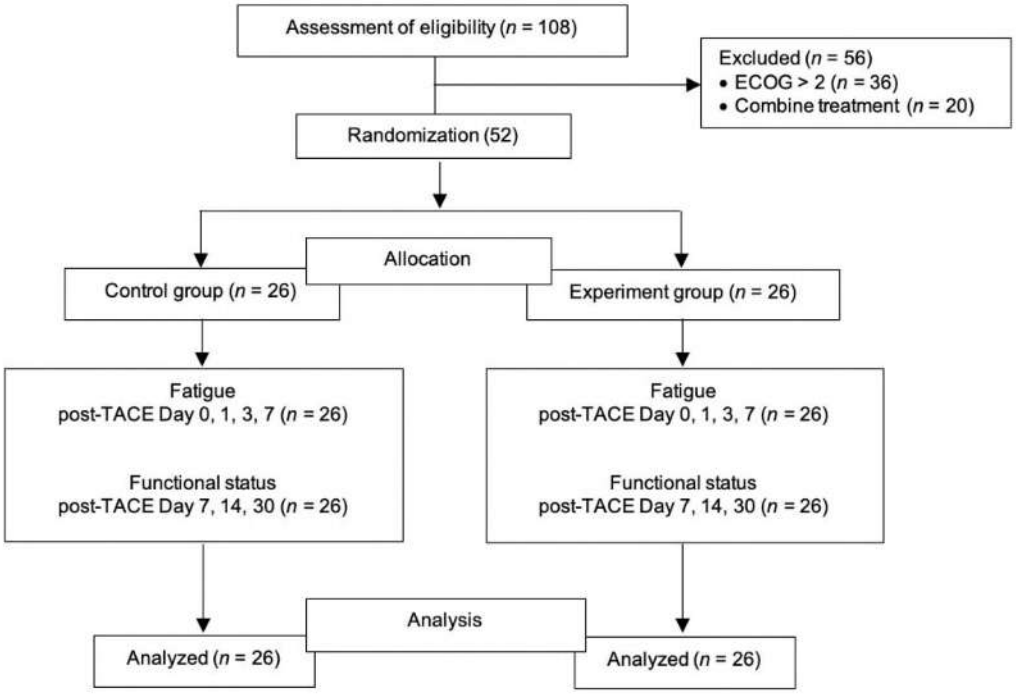

Figure 1 Flow of study participants

Instruments

Three instruments were used in this study, validated by three clinical experts in cancer care. First, the Demographic and Health related data Questionnaire was used to gather participants' information such as age, gender, marital status, educational level, religion, occupation, and treatment information, such as disease stage (BCLC stage, and Child-Pugh class), treatment history, number of TACE treatments, co-morbidities, and history of chronic illness medications. Second, the Thai version of the fatigue severity scale, developed by Krupp et al. (1989) and translated into Thai by Sawasdee et al. (2017), was used to measure fatigue severity. It consists of 9 items in the form of Likert scales with values ranging from 1 to 7. A value of 1 indicates no fatigue symptoms/no symptoms/disagreement, while 7 shows a high level of fatigue. Therefore, higher scores mean a higher level of fatigue. The Cronbach's alpha coefficient of the fatigue severity scale was 0.9.

Third, the Thai version of the Enforced Social Dependency Scale (ESDS), developed by Tang and McCorkle (2002) and translated into Thai by Asdornwised et al. (2006), was used to evaluate activities and responsibilities in which patients required assistance from other people due to physical deficiencies. The questionnaire used to assess functional status had possible scores in the range of 10-51. A high score indicated a patient with low functional status. Scores were divided into three levels: scores in the range of 10-23 indicated high functional status. Scores in the range of 24-37 indicated intermediate functional status. Finally, scores in the 38-51 showed low functional status. The reliability of the questionnaire, as determined by using Cronbach's alpha coefficient, equaled 0.89.

Intervention

The experimental group received a comprehensive discharge planning program in addition to routine care. The comprehensive discharge planning program was developed based on the Transitional Care Model (Naylor et al., 2018). The healthcare team consisted of a radiologist and registered nurses in radiology who were promoting health outcomes throughout the period from hospital to discharge. The comprehensive discharge planning program consisted of the preparation of patients before discharge from the hospital to home, including the provision of knowledge about the illness, treatment procedures, information about complications and side effects post-treatment, the provision of data about self-care and fatigue management, a handbook, and educational multimedia video clips about fatigue management and functional status management. Three qualified experts, including an interventional radiologist, an oncology nurse, and interventional radiology nurses, validated the program and questionnaire, such as the fatigue and functional status for content validity (CVI = 1). In addition, before the comprehensive discharge planning program was used, it was

trialed with ten participants that were representative of the sample group in order to assess the understanding of the content. Overall, the comprehensive discharge planning program intervention consisted of two phases: discharge planning during the hospital visit and four weekly home telephone follow-ups to provide health education, counseling, monitoring, and emotional support tailored to the patient's needs and using their handbooks. **Figure 2** presents the details of the comprehensive discharge planning program intervention.

The control group received routine care (Information about hospitalization, TACE treatment, post-TACE) without access to the comprehensive discharge planning program.

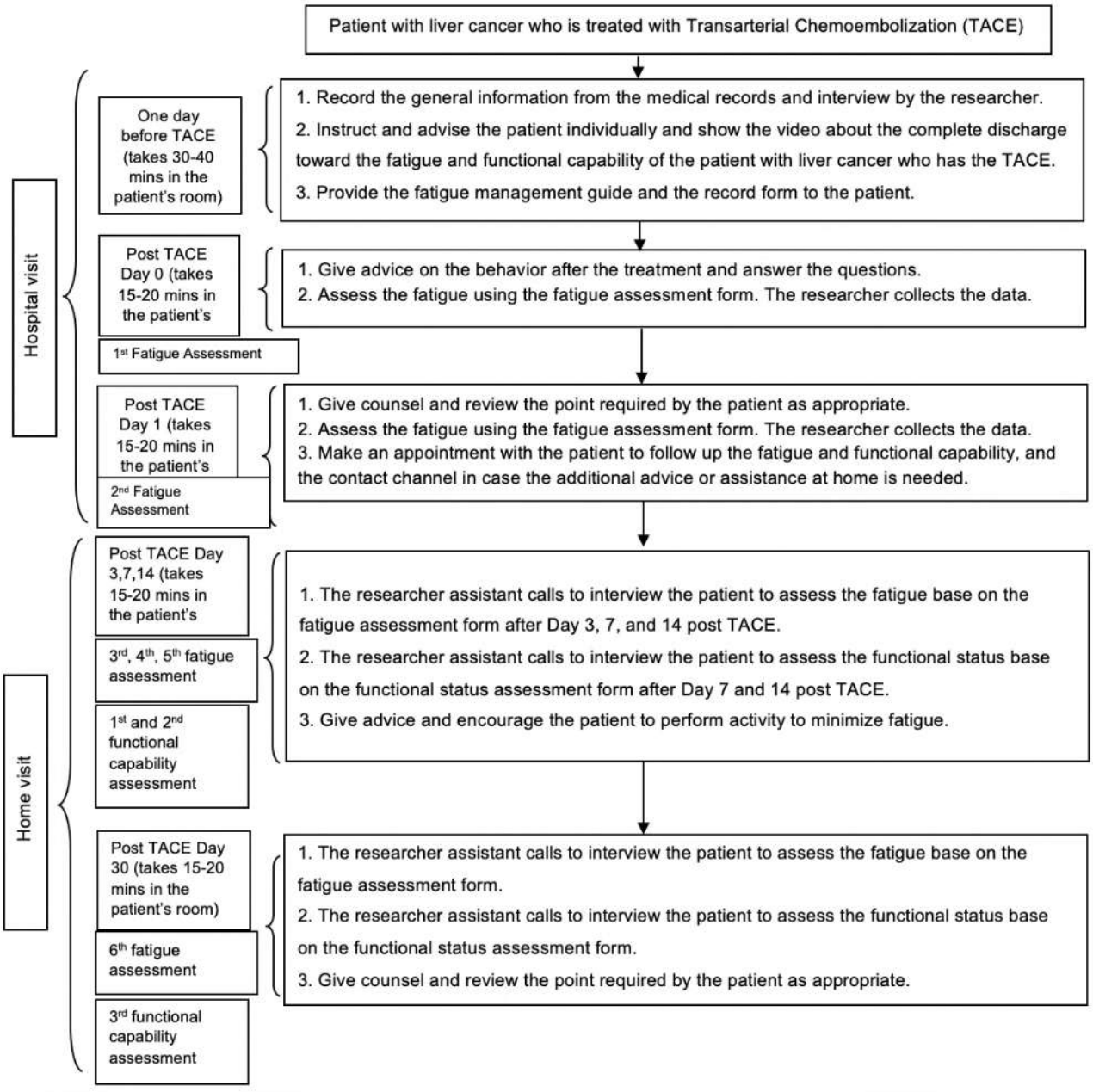

Figure 2 Flow of comprehensive discharge planning program intervention

Data Collection

Data were collected using validated questionnaires by the researchers and a research assistant. The research assistant is a nurse with experience in caring for patients with hepatocellular carcinoma undergoing transarterial chemoembolization for at least two years. In addition, the researchers provided training on how to use tools, such as The Fatigue Severity Scale and The Enforced Social Dependency Scale, and the interrater reliability was tested, which has a kappa value of 0.64 and a significance of .05, indicating it is acceptable to collect research data (Pasunon, 2015).

The data collection process in both experimental and control groups is similar (**Figure 2**). On the day after each sample received TACE (post-TACE Day 0), the researchers met with the patient at the inpatient ward to inquire about post-treatment symptoms and evaluate the person's fatigue using the fatigue evaluation form. First, the researchers collected data in person (first fatigue evaluation). On Day 1 post-TACE (post-TACE Day 1), the researchers met with each subject in

the inpatient ward to inquire about their general symptoms and evaluate their fatigue using the fatigue evaluation form. Then the researchers collected data in person for the second fatigue evaluation. On Days 3, 7, and 14 post-TACE (post-TACE Days 3, 7, and 14) and when the patients were at home, the research assistants interviewed the patients through telephone calls. The patients were evaluated for post-TACE fatigue on Days 3, 7, and 14 and post-TACE functional status on Days 7 and 14 (first and second functional status evaluations). On Day 30 post-TACE, while the patients were at home, the research assistants interviewed the patients through telephone calls. They were evaluated for fatigue (sixth fatigue evaluation) and functional status (third functional status evaluation) and were given consultation as needed by the patients and the doctor's appointment times.

Data Analysis

SPSS version 25 was used for the data analysis. First, demographic and treatment background data differences were compared using a Chi-squared test and Fisher's exact test. Next, the differences in the groups' fatigue and functional status scores were compared using the Wilcoxon signed-rank test. Finally, the Mann-Whitney U test was used to compare the fatigue scores and functional status at different periods between the groups.

Ethical Consideration

The research was conducted after approval from the Institutional Review Board Faculty of Nursing Mahidol University (COA No.IRB-NS2020/549.2402) and approval from the Institutional Review Board Faculty of Medicine, Chulalongkorn University (COA No.334/2020). Each participant signed informed consent prior to data collection. Before signing the informed consent, the researchers first explained the purpose of the study and the confidentiality of the data. The participants could withdraw from the study at any time without penalty. The permissions to use the instruments were granted by the original authors before data collection.

Results

Characteristics of the Participants

A total of 52 participants was divided into 26 participants in the experimental group and 26 in the control group. There were more males (69.2%) than females in both groups. The ages ranged from 37 to 63 years, with most in the range of 60 to 70 years, accounting for 50%. Most participants were Buddhist, were married 69.2%, 28.8% had an elementary level of education, worked as a government official, and had monthly incomes of less than 5,000 baht a month. About half of the participants (51.9%) subscribed to the universal health coverage scheme. Most of them (65.4%) lived in the central part of Thailand and had comorbidity such as diabetes and hypertension (73.1%). Most of the participants were treated by transarterial chemoembolization for the first time (61.5%) with the stage of the disease in Barcelona Clinic Liver Cancer (BCLC) B (86.5%), Child-Pugh (96.2%), and Score 5 (71.2%). The level of the Eastern Cooperative Oncology Group (ECOG) score was mostly at level 0 for 86.5% of the participants. The main side effect of receiving transarterial chemoembolization was fatigue at 9.6%.

Upon comparison of the general characteristics between the experimental and control groups in terms of personal information, such as general information and their medical treatment, it was found that there were no statistically significant differences between the experimental and control groups (**Table 1**).

Table 1 The baseline demographic and health-related data of the participants in the control and experimental groups

Characteristics of the Participants	Control group	Experimental group	*p*-value
	n (%)	*n* (%)	
Sex			
Male	17 (65.4)	19(73.2)	0.548[C]
Female	9 (34.6)	7 (26.9)	0.548[C]
Age (years)			0.856 [C]
< 60	8 (30.8)	7 (26.9)	
60-70	12 (46.1)	14 (53.9)	
> 70	6 (23.1)	5 (19.2)	
Religion			
Buddhist	26 (100)	26 (100)	
Status			0.631 [F]
Single	2 (7.7)	4 (15.4)	
Married	18 (69.2)	18 (69.2)	
BCLC			1.000 [F]
A	3 (11.6)	3 (11.6)	
B	23 (88.4)	22 (84.6)	
C	0	1 (3.8)	
Child-Pugh			1.000 [F]
A	25 (96.2)	25 (96.2)	
B	1 (3.8)	1 (3.8)	
ECOG Score			0.223 [C]
Score 0	21 (80.8)	24 (92.3)	
Score 1	5 (19.2)	2 (7.7)	

C = *p*-value from Chi-Square test and F = Fisher's Exact Test

Fatigue Levels

Table 2 shows the mean and mean ranks for the fatigue scores between the experimental and control groups. The experimental and the control groups on Day 30 had different mean ranks for fatigue that were statistically significant (p = 0.003). The experimental group had a lower mean rank for fatigue than the control group at 1.27±0.58 and 2.50±1.51, respectively. This study found that the comprehensive discharge plan for patients with hepatocellular carcinoma undergoing transarterial chemoembolization can reduce the symptom of fatigue on Day 30 post-TACE at a statistically significant (p <0.05) level.

Table 2 Comparison of the mean rank for fatigue after the patients had undergone transarterial chemoembolization on Days 0, 3, 7, 14, and 30 between the experimental and control groups

Fatigue	Experiment (n = 26)		Control (n = 26)		Mean Rank		Median	IQR	Z	p-value
	Mean	±SD	Mean	±SD	Experiment	Control				
Day 0	2.22	±1.29	2.50	±1.51	25.37	27.63	2.00	2.00	0.546	0.585
Day 1	2.37	±1.40	2.49	±1.44	26.21	26.79	2.00	1.86	0.138	0.890
Day 3	2.60	±1.22	2.63	±1.18	26.50	26.50	2.28	1.00	0.000	1.000
Day 7	2.21	±1.23	2.81	±1.36	22.75	30.25	2.11	1.75	1.790	0.073
Day 14	1.88	±1.04	2.27	±1.04	23.35	29.65	1.89	1.78	1.533	0.125
Day 30	1.27	±0.58	1.77	±0.85	20.67	32.33	1.22	0.89	2.934	0.003*

p-value from Mann-Whitney U Test, *Significant at the 0.05 level

Functional Status

Table 3 shows the mean rank for the functional status score between the experimental and control groups. The mean rank for functional status at all intervals of patients with hepatocellular carcinoma after undergoing transarterial chemoembolization between the experimental and control groups showed no statistically significant difference (p >0.05). However, there was a difference in the mean rank of functional status in the patients with hepatocellular carcinoma that had undergone transarterial chemoembolization during Days 7-14 between the experimental and control groups that was statistically significant (p = 0.020;). On Day 14, after patients had undergone transarterial chemoembolization, the experimental group had a lower mean rank for functional status from Day 7 than the control group (a lower score means high daily task performance).

Table 3 Comparison of the mean rank for functional status after the patients had undergone transarterial chemoembolization on Days 7, 14, and 30 between the experimental and control groups

Functional status	Experiment (n = 26)		Control (n = 26)		Mean Rank		Median	IQR	Z	p-value
	Mean	±SD	Mean	±SD	Experiment	Control				
Time										
Day 7	12.31	±1.81	13.04	±4.25	26.56	26.44	12.00	1.75	0.028	0.977
Day 14	11.62	±1.68	13.04	±4.25	23.90	29.10	12.00	1.78	1.292	0.196
Day 30	11.35	±1.44	12.69	±4.19	23.79	29.21	12.00	0.89	1.382	0.167
Time Difference										
Day 7 - Day 14	0.69	±1.57	0.00	±0.00	29.00	24.00	0.00	0.00	2.326	0.020*
Day 7 - Day 30	0.96	±1.75	0.35	±0.98	29.12	23.88	0.00	1.00	1.744	0.081

p-value from Mann-Whitney U test, *Significant at the 0.05 level

Discussion

Demographic data and health history were tested for differences using the chi-square test. However, the preliminary agreement for the chi-square was not met, so Fisher's test statistics were applied instead. The participants' personal data and medical histories were not statistically significant between the experimental and control groups (p >0.05).

This study found that the fatigue scores in the experimental and control groups were low and increased on Day 3 post-TACE. This is consistent with Nillert et al. (2019), which found a low fatigue score in patients that received transarterial chemoembolization. The results from this study are also in accordance with Cao et al. (2013) and Shun et al. (2012), which found that fatigue on Day 3 post-TACE increased and gradually decreased during 4-8 weeks after treatment.

This study found that the comprehensive discharge planning program for patients with hepatocellular carcinoma that have undergone transarterial chemoembolization could reduce the symptom of fatigue in the experimental group, which was lower than that of the control group on Day 30 post-TACE at a statistically significant (p <0.05) level (Table 1). The comprehensive discharge planning program includes information about the disease, treatment procedures, complications and side effects after treatment, self-care education, and information about fatigue management. Fatigue management was composed of walking exercise (Ferguson, 2014), muscle exercise (Kim & Seo, 2010), massage (Cawley, 1997), and taking good rest (Tietzel & Lack, 2002). This is consistent with a previous study by Lan et al. (2015), who studied a fatigue management program that resulted in a low level of fatigue. It is also in line with Jaikamsueb (2009) and Srisuksiriphan (2008), who studied walking exercise at home in patients with breast cancer that had received chemotherapy, where it was found that walking exercise at home could reduce fatigue. Also, Tomlinson et al. (2014) found that exercise can reduce fatigue

Moreover, according to the literature review (Koya et al., 2019), it was found that a program that provides knowledge by teaching exercise and follow-up at home can reduce the

symptom of fatigue and can also reduce anxiety as well as prepare patients to cope with side effects. When the patient is discharged from the hospital and receives follow-up by the nurse specialist, they have a better quality of life, and their return to the hospital before the appointment date is reduced (Salah et al., 2012).

This study also found that the comprehensive discharge program helped increase the functional status of patients with hepatocellular carcinoma that had undergone transarterial chemoembolization. There was a difference in the mean rank of functional status in patients with hepatocellular carcinoma undergoing transarterial chemoembolization during Days 7-14 between the experimental and control groups that was statistically significant (p = 0.020). On Day 14, after the patients had undergone transarterial chemoembolization, the experimental group had high functional status (a lower mean rank for functional status) from Day 7 than the control group.

The patients are more capable of performing daily activities as well as living in society. This is in accordance with Cheville et al. (2013) and Tsianakas et al. (2017) found that a home-based walking exercise program reduced fatigue and increased the ability to perform daily activities, quality of life, and the patient's self-care.

Implications of the Study

This comprehensive discharge program provides recommendations and practices for when the patient returns home, fatigue and clinical risk management, follow-ups as appointed, and home follow-ups. The patients that have received TACE should be encouraged to engage in self-care education and symptom follow-up when returning home. This is in line with Luciani et al. (2008) found that discharge planning before returning home can reduce the symptom of fatigue and depression in patients with hepatocellular carcinoma that have undergone transarterial chemoembolization at a statistically significant level. The discharge planning program comprises the patient's preparation for admission and preparation when being discharged from the hospital and following up with a specialized health team. As Gupta et al. (2007) stated, the patients' follow-up could improve their quality of life and satisfaction and increase self-care ability.

In addition, this comprehensive discharge planning program effectively reduces fatigue symptoms and enhances the functional status of patients with hepatocellular carcinoma undergoing transarterial chemoembolization. Therefore, the comprehensive discharge planning program developed in this study can be used by nurses and multidisciplinary teams in order to achieve the effectiveness of nursing care for patients nationally and internationally.

Limitations of the Study

Patients might receive knowledge and advice on how to behave from a doctor or radiologist more and less differently; however, each patient receives equal time for advice. It might affect the patients' practice during staying at home.

Conclusion

The comprehensive discharge planning program was found to be effective in reducing fatigue and improving functional status. By creating a discharge plan for patients before returning home, the patients can be encouraged to take care of themselves effectively and manage their complications. In addition, this comprehensive discharge planning prepares patients for treatment, for being ready when they are discharged from the hospital, and for continued monitoring with a specialized healthcare team. A comprehensive discharge planning program is still being used in hospitals with a multidisciplinary collaboration to reduce fatigue and improve self-care after TACE treatment. Thus, the researchers recommend that nurses use the discharge planning program alongside planning performance improvements involving multiple disciplines to produce desirable outcomes for patients and their families.

Declaration of Conflicting Interest

The authors declare that there are no conflicting interests.

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Authors' Contributions

NY conceived the outline, wrote the introduction, literature review, method, procedure, data analysis, and conclusion, and reviewed the whole paper for cohesiveness. UA contributed to the conceptualization of the project, project design, IRB approval, data analysis, and drafted the manuscript. All other authors (KW and NP) contributed to the critical analysis of the content. Finally, all authors approved the final version to be published.

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Data Availability

The datasets generated during or analyzed during the current study are not publicly available due to subject confidential information but are available from the corresponding author on reasonable request.

References

Albert, N. M., Barnason, S., Deswal, A., Hernandez, A., Kociol, R., Lee, E., Paul, S., Ryan, C. J., & White-Williams, C. (2015). Transitions of care in heart failure: A scientific statement from the American Heart Association. *Circulation: Heart Failure*, *8*(2), 384-409. https://doi.org/10.1161/HHF.0000000000000006

Asdornwised, U., Ruksanaboonsong, P., Brown, L., & McCauley, K. (2006). *Comprehensive discharge planning and home follow-up of Thai elderly coronary artery bypass graft patients*. https://elibrary.trf.or.th/project_content.asp?PJID=PDF4480038

Barsevick, A. M., Dudley, W., Beck, S., Sweeney, C., Whitmer, K., & Nail, L. (2004). A randomized clinical trial of energy conservation for patients with cancer-related fatigue. *Cancer: Interdisciplinary International Journal of the American Cancer Society*, *100*(6), 1302-1310. https://doi.org/10.1002/cncr.20111

Berger, A. M. (1998). Patterns of fatigue and activity and rest during adjuvant breast cancer chemotherapy. *Oncology Nursing Forum*, *25*(1), 51-62.

Cabrera, R., & Nelson, D. R. (2010). Review article: The management of hepatocellular carcinoma. *Alimentary Pharmacology & Therapeutics*, *31*(4), 461-476. https://doi.org/10.1111/j.1365-2036.2009.04200.x

Cao, W., Li, J., Hu, C., Shen, J., Liu, X., Xu, Y., & Ye, Z. (2013). Symptom clusters and symptom interference of HCC patients undergoing TACE: A cross-sectional study in China. *Supportive Care in Cancer*, *21*(2), 475-483. https://doi.org/10.1007/s00520-012-1541-5

Cawley, N. (1997). A critique of the methodology of research studies evaluating massage. *European Journal of Cancer Care*, *6*(1), 23-31. https://doi.org/10.1111/j.1365-2354.1997.tb00265.x

Cheville, A. L., Kollasch, J., Vandenberg, J., Shen, T., Grothey, A., Gamble, G., & Basford, J. R. (2013). A home-based exercise program to improve function, fatigue, and sleep quality in patients with Stage IV lung and colorectal cancer: A randomized controlled trial. *Journal of Pain and Symptom Management*, *45*(5), 811-821. https://doi.org/10.1016/j.jpainsymman.2012.05.006

Donovan, K. A., Jacobsen, P. B., Andrykowski, M. A., Winters, E. M., Balducci, L., Malik, U., Kenady, D., & McGrath, P. (2004). Course of fatigue in women receiving chemotherapy and/or radiotherapy for early stage breast cancer. *Journal of Pain and Symptom Management*, *28*(4), 373-380. https://doi.org/10.1016/j.jpainsymman.2004.01.012

Ferguson, B. (2014). ACSM's guidelines for exercise testing and prescription 9th Ed. 2014. *The Journal of the Canadian Chiropractic Association*, *58*(3), 328.

Fongchan, S., Vorapongsathorn, S., Bhavabudananda, P., & Chooratna, K. (2019). Liver cancer prevention and control. *Thai Cancer Journal*, *39*(2), 64-74.

Greene, D., Nail, L. M., Fieler, V. K., Dudgeon, D., & Jones, L. S. (1994). A comparison of patient-reported side effects among three chemotherapy regimens for breast cancer. *Cancer Practice*, *2*(1), 57-62.

Gupta, D., Lis, C. G., & Grutsch, J. F. (2007). The relationship between cancer-related fatigue and patient satisfaction with quality of life in cancer. *Journal of Pain and Symptom Management*, *34*(1), 40-47. https://doi.org/10.1016/j.jpainsymman.2006.10.012

Jaikamsueb, R. (2009). Effects of an educative-supportive nursing program combined with walking exercise on fatigue, insomnia, and anxiety among breast-cancer patients receiving chemotherapy. *Thai Cancer Journal*, *29*, 152-161.

Khamboon, T. (2014). *Symptom clusters and their influences on the functional status in advanced lung cancer patients receiving chemotherapy*. Bangkok: Mahidol University.

Kim, Y.-J., & Seo, N.-S. (2010). Effects of progressive muscle relaxation on nausea, vomiting, fatigue, anxiety, and depression in cancer patients undergoing chemotherapy. *Journal of Korean Oncology Nursing*, *10*(2), 171-179. https://doi.org/10.5388/jkon.2010.10.2.171

Kitiyakara, T. (2018). Advances in biomarkers for HCC. *Thai Journal of Hepatology*, *2*, 29-32.

Koya, S., Kawaguchi, T., Hashida, R., Hirota, K., Bekki, M., Goto, E., Yamada, M., Sugimoto, M., Hayashi, S., & Goshima, N. (2019). Effects of in-hospital exercise on sarcopenia in hepatoma patients who underwent transcatheter arterial chemoembolization. *Journal of Gastroenterology and Hepatology*, *34*(3), 580-588. https://doi.org/10.1111/jgh.14538

Krupp, L. B., LaRocca, N. G., Muir-Nash, J., & Steinberg, A. D. (1989). The fatigue severity scale: Application to patients with multiple sclerosis and systemic lupus erythematosus. *Archives of Neurology*, *46*(10), 1121-1123. https://doi.org/10.1001/archneur.1989.00520460115022

Lan, S.-C., Lin, Y.-E., Chen, S.-C., Lin, Y.-F., & Wang, Y.-J. (2015). Effects of acupressure on fatigue and depression in hepatocellular carcinoma patients treated with transcatheter arterial chemoembolization: A quasi-experimental study. *Evidence-Based Complementary and Alternative Medicine*, 496485. https://doi.org/10.1155/2015/496485

Lenz, E. R., & Pugh, L. C. (2018). The theory of unpleasant symptoms. In M. J. Smith & P. R. Liehr (Eds.), *Middle range theory for nursing* (4th ed., pp. 69-90). Springer.

Li, C.-F., Feng, S.-H., & Chien, L.-Y. (2015). Relationship between symptom distress and fatigue in hepatocellular carcinoma patients who received transcatheter arterial embolization. *Hu Li Za Zhi*, *62*(3), 57-65. https://doi.org/10.6224/JN.62.3.57

Luciani, A., Jacobsen, P. B., Extermann, M., Foa, P., Marussi, D., Overcash, J. A., & Balducci, L. (2008). Fatigue and functional dependence in older cancer patients. *American Journal of Clinical Oncology*, *31*(5), 424-430. https://doi.org/10.1097/COC.0b013e31816d915f

Moher, D., Hopewell, S., Schulz, K. F., Montori, V., Gøtzsche, P. C., Devereaux, P. J., Elbourne, D., Egger, M., & Altman, D. G. (2010). CONSORT 2010 explanation and elaboration: Updated guidelines for reporting parallel group randomised trials. *BMJ*, *340*, c869. https://doi.org/10.1136/bmj.c869

National Comprehensive Cancer Network. (2020). *Fatigue*. https://www.nccn.org/patients/resources/life_with_cancer/managing_symptoms/fatigue.aspx

Naylor, M. D., Brooten, D. A., Campbell, R. L., Maislin, G., McCauley, K. M., & Schwartz, J. S. (2004). Transitional care of older adults hospitalized with heart failure: A randomized, controlled trial. *Journal of the American Geriatrics Society*, *52*(5), 675-684. https://doi.org/10.1111/j.1532-5415.2004.52202.x

Naylor, M. D., Hirschman, K. B., Toles, M. P., Jarrín, O. F., Shaid, E., & Pauly, M. V. (2018). Adaptations of the evidence-based transitional care model in the US. *Social Science & Medicine*, *213*, 28-36. https://doi.org/10.1016/j.socscimed.2018.07.023

Nillert, A., Srimoragot, P., Wongkongkam, K., & Thamtorawat, S. (2019). Factors predicting quality of life of patients with hepatocellular carcinoma undergoing transarterial chemoembolisation. *Journal of Thailand Nursing and Midwifery Council*, *34*(2), 127-140.

Pasunon, P. (2015). Evaluation of inter-rater reliability using Kappa statistics. *The Journal of Faculty of Applied Arts, King Mongkut's University of Technology North Bangkok*, *8*(1), 2-20.

Salah, M., Tawfeek, S., & Ahmed, H. (2012). Radiofrequency ablation therapy: Effect of educational nursing guidelines on knowledge and post ablation syndrome for patients with hepatocellular carcinoma. *Journal of American Science*, *8*(2), 719-729.

Sawasdee, A., Preechawoong, S., & Jitpanya, C. (2017). Relationships between pain, sleep quality, depressive symptoms, and fatigue in post stroke patients. *Kuakarun Journal of Nursing*, *24*(2), 7-22.

Shun, S.-C., Chen, C.-H., Sheu, J.-C., Liang, J.-D., Yang, J.-C., & Lai, Y.-H. (2012). Quality of life and its associated factors in patients with hepatocellular carcinoma receiving one course of transarterial chemoembolization treatment: a longitudinal study. *The Oncologist*, *17*(5), 732-739. https://doi.org/10.1634/theoncologist.2011-0368

Shun, S.-C., Chiou, J.-F., Lai, Y.-H., Yu, P.-J., Wei, L.-L., Tsai, J.-T., Kao, C.-Y., & Hsiao, Y.-L. (2008). Changes in quality of life and its related factors in liver cancer patients receiving stereotactic radiation therapy. *Supportive Care in Cancer*, *16*(9), 1059-1065. https://doi.org/10.1007/s00520-007-0384-y

Shun, S.-C., Lai, Y.-H., Jing, T.-T., Jeng, C., Lee, F.-Y., Hu, L.-S., & Cheng, S.-Y. (2005). Fatigue patterns and correlates in male liver cancer patients receiving transcatheter hepatic arterial chemoembolization. *Supportive Care in Cancer*, *13*(5), 311-317. https://doi.org/10.1007/s00520-004-0740-0

Srisuksiriphan, S. (2008). Effect of home-based walking exercise program on fatigue in breast cancer patients receiving adjuvant chemotherapy. *Nursing Journal*, *35*(1), 144-156.

Sun, V. C.-Y., & Sarna, L. (2008). Symptom management in hepatocellular carcinoma. *Clinical Journal of Oncology Nursing*, *12*(5), 759-766. https://doi.org/10.1188%2F08.CJON.759-766

Suwisith, N., Hanucharurnkul, S., Dodd, M., Vorapongsathorn, T., Pongthavorakamol, K., & Asavametha, N. (2008). Symptom clusters and functional status of women with breast cancer. *Pacific Rim International Journal of Nursing Research*, *12*(3), 153-165.

Tang, S., & McCorkle, R. (2002). *A user's manual for the Enforced Social Dependency Scale*. New Haven, CT: Yale School of Nursing.

Thai Association for the Study of the Liver. (2015). *Liver cancer*. Nonthaburi, Thailand: Parbpim Printing.

Tietzel, A. J., & Lack, L. C. (2002). The recuperative value of brief and ultra-brief naps on alertness and cognitive performance. *Journal of Sleep Research*, *11*(3), 213-218. https://doi.org/10.1046/j.1365-2869.2002.00299.x

Tomlinson, D., Diorio, C., Beyene, J., & Sung, L. (2014). Effect of exercise on cancer-related fatigue: A meta-analysis. *American Journal of Physical Medicine & Rehabilitation*, *93*(8), 675-686. https://doi.org/10.1097/PHM.0000000000000083

Tsianakas, V., Harris, J., Ream, E., Van Hemelrijck, M., Purushotham, A., Mucci, L., Green, J. S. A., Fewster, J., & Armes, J. (2017). CanWalk: A feasibility study with embedded randomised controlled trial pilot of a walking intervention for people with recurrent or metastatic cancer. *BMJ Open*, *7*(2), e013719. http://dx.doi.org/10.1136/bmjopen-2016-013719

Vilaichone, R. (2009). *Practical gastroenterology and hepatology*. Bangkok: Watcharin Publishing.

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Prevalence of depression in patients with end-stage renal disease undergoing hemodialysis in Saudi Arabia: A cross-sectional study

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Abstract

Background: A hemodialysis is a treatment option for patients with End-Stage Renal Disease (ESRD). However, patients undergoing hemodialysis three times per week may experience psychological issues, including depression, which are highly prevalent among patients. Unfortunately, most healthcare providers fail to recognize the symptoms of depression due to overlap with other somatic symptoms; thus, depression remains undiagnosed.

Objective: This study aimed to estimate the prevalence of depression and compare the differences in depression symptoms according to the sociodemographic characteristics of patients with ESRD undergoing hemodialysis.

Method: A descriptive, cross-sectional study was conducted from August to October 2021 with a total of 132 hemodialysis patients using the Beck Depression Inventory (BDI II) questionnaire to examine symptoms of depression at multiple health centers in Jeddah. Descriptive statistics, Mann-Whitney U, Kruskal-Wallis, Post-hoc analysis using Conover tests were used for data analysis.

Results: The prevalence of depression in hemodialysis patients was 51.5%, 25.8%, 15.9%, and 6.8%, with minimal, mild, moderate, and severe symptoms, respectively. Depression exhibited a significant relationship with sex (p = 0.034), with females showing higher mean depression scores than males. Additionally, depression scores were statistically significant across the different levels of education (p = 0.019), with the mean depression scores significantly highest in subjects who had only primary school level of education. Furthermore, the most common symptoms associated with depression were found to be energy loss and fatigue.

Conclusion: Depression prevalence was relatively low among patients with ESRD undergoing hemodialysis, and a loss of energy and fatigue were the most common symptoms correlated with depression. Hence, nurses should be trained on how to routinely use psychological screening scales among patients with ESRD undergoing hemodialysis.

Keywords

prevalence; depression; hemodialysis; end-stage renal disease; ESRD; cross-sectional study; nursing; Saudi Arabia

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Background

End-Stage Renal Disease (ESRD) is a major public health issue, defined as '… kidney failure sufficiently severe to require maintenance dialysis or kidney transplantation to maintain health and life (Semaan et al., 2018). It is a global phenomenon whose prevalence is largely attributed to the increased cases of lifestyle diseases worldwide, such as diabetes and hypertension (Ganu et al., 2018). However, advances in medicine and contemporary understanding of chronic kidney disease (CKD) and its complications have led to the development of treatments that increase the survival rates of patients with ESRD.

Maintenance dialysis of ESRD presently involves hemodialysis and peritoneal dialysis as the primary forms of ESRD treatment, even though the former is the most commonly used (Fadzli et al., 2021; Semaan et al., 2018). Despite this progress, some studies report that patients who undergo maintenance hemodialysis report lower overall outcomes, given the burden that dialysis has on the patient's

physical, biological, psychological, social, and cultural dimensions. The diseases can restrict physical functioning, undermine psychological health, increase dependency on caregivers to carry out activities of daily living, limit one's ability to engage in social activity, and increase susceptibility to comorbidity and medical complications – all of which are considered factor determinants of one's general well-being (Ganu et al., 2018; Teles et al., 2018).

In addition, the imposition caused by ESRD and dialysis treatments on patients' well-being can result in psychological stress and anxiety, which may contribute to the depressive symptoms observed in dialysis patients. According to Chan et al. (2017), depression is a highly common comorbidity in patients with ESRD on hemodialysis, with a prevalence rate of up to 46%. Goh and Griva (2018) assert that people with ESRD are five times more likely to suffer from depression than the general population. Depression can be defined as '… a common mental disorder characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, tiredness, and poor concentration (World Health Organization, 2021). An interactive relationship between the psychological stress caused by the ESRD and hemodialysis burden and depressive symptoms could adversely affect the patient's physiological, functional, social, and emotional outcomes (Abdi et al., 2018). It is considered the leading cause of disability, conceptualized as the impact depression has on functional competence in the various aspects of daily life (AlShahrani et al., 2018). Reyes et al. (2021) note that such outcomes could undermine the patient's road to recovery, resulting in poor treatment adherence and worsening their mental health status – a critical challenge for the nursing practice.

In addition to those associated with maintenance hemodialysis of ESRD, patients who develop depression may exhibit various symptoms such as fatigue, sleep disorders, treatment limitations, changes in family roles and social communication, limited daily activities, uncertainty about the future, unemployment, dependence on healthcare professionals, and reduced sexual performance (Abdi et al., 2018; Sriyuktasuth & Phligbua, 2021). The challenge with this, however, is that some of these symptoms may be mistaken for the side effects of hemodialysis, making it quite challenging for early diagnosis and assessment to help improve patients' well-being as they go through the maintenance hemodialysis process. The issue has been acknowledged by various authors, who establish that depression and uremic symptoms sometimes overlap, which makes it difficult to diagnose and assess depression for this particular patient group (Abdi et al., 2018; Al Awwa & Jallad, 2018). Thus, a complete and separate evaluation of these disorders would establish that the symptoms result from a psychiatric disorder – depression and not part of the uremic milieu – to help provide the most appropriate care and enhance overall well-being throughout maintenance hemodialysis for ESRD (Cohen et al., 2016).

Two critical concepts to help us discern between depressive and uremic symptoms are the prevalence and incidence of the targeted symptoms. Prevalence refers to the percentage of people who meet the diagnostic criteria for a condition – depression, in this case, at a particular time, usually 30 days before the examination (Ormel et al., 2022). On the other hand, incidence refers to the rate at which individuals develop the condition for a period (Wang & Cheng, 2020). The two evaluations can help us understand the issue's significance and the context within which it occurs, such as understanding the various risk factor variables that influence depressive symptoms in patients with ESRD on hemodialysis. Ultimately, these will help inform the key recommendations for medical practice on helping identify and assess depression to work towards better management of post-treatment patient outcomes to enhance the utility of maintenance hemodialysis. For example, El Filali et al. (2017) ascertain that the use of prevalence for a particular patient population can help with understanding the severity of the issue in terms of susceptibility, the risk imminent for patients, and the need to develop critical measures to mitigate the adverse psychological implications of hemodialysis. Incidence would help facilitate the development of these measures by helping establish the risk factors that nursing practice should target to reduce susceptibility and enhance the quality of living as the primary objective.

Most studies that sought to determine the prevalence of depression in patients with ESRD on hemodialysis, focusing on isolating depressive symptoms, affirmed a positive association between maintenance hemodialysis and depression (Al Awwa & Jallad, 2018; Khan et al., 2019; Ravaghi et al., 2017). However, the prevalence rates vary with the population observed, with authors reporting different findings though the average reports usually place depression prevalence between 10 and 45% for patients with ESRD on hemodialysis (Chan et al., 2017; Yang et al., 2021). For example, Al Awwa and Jallad (2018) discovered a prevalence rate of 29% for patients with ESRD on hemodialysis. Semaan et al. (2018) reported a depression prevalence rate of 40.8% and an anxiety rate of 39.6%. Of the selected sample, about 24.1% had comorbid depression and anxiety. In contrast, Ravaghi et al. (2017) observed an overall prevalence of depression of 62% for maintenance hemodialysis patients in Iran. These observations highlight a differential aspect in the target population which can be segmented based on various characteristics, referred to as predictors of prevalence, which can be used to properly and effectively manage patient outcomes post-treatment, as noted by Khan et al. (2019).

The differences in prevalence outcomes position the idea that populations may vary based on their characteristics, which challenges the nursing practice's ability and competence to meet the specific needs of these changing and diverse demands from patients with ESRD on hemodialysis. Nobahar and Tamadon (2016) argue that patients with ESRD on maintenance hemodialysis require specialized care to meet specific needs, and the differences in care needs can be effectively addressed if an analysis of barriers and facilitators of proper patient management is conducted. The rationale stems from the view that each person is unique, and the combination of various social and demographic factors may influence how each person responds to hemodialysis and the burden of ESRD (Gerogianni et al., 2018). The social element is informed by the view that the social environment in which patients live or influence their interactions will influence the perception of available social support to help deal with the adverse consequences of hemodialysis (Lilympaki et al., 2016). As such, a contextual analysis of social and demographic characteristics for all patients can help inform

best-practice recommendations for nursing practice, with favorable outcomes for patient quality of living. These characteristics may be spread through various demographic variables, including age, gender, sex, lifestyle, socio-economic and socio-cultural factors, family status, and other significant factors that could influence patients' mental health and wellbeing.

This research aimed to estimate the prevalence of depression and compare the differences in depression symptoms according to the sociodemographic characteristics of patients with ESRD undergoing hemodialysis. To achieve the overall research aim, two key objectives were explored. First, the prevalence of depression in patients with ESRD on hemodialysis was analyzed. The goal was to ascertain the relational dynamics between hemodialysis and depression to validate the findings on the supposed relationship. Further, the research sought to compare the differences in depression symptoms according to the sociodemographic characteristics of patients with ESRD undergoing hemodialysis.

Methods

Study Design

A descriptive, cross-sectional study design was conducted among 132 patients diagnosed with ESRD and on hemodialysis. The prevalence of depression among these patient groups and the factors that could potentially influence an individual's susceptibility to develop depressive symptoms were investigated. The study was conducted with and targeted hemodialysis patients from multiple health centers in Jeddah. The reason for selecting these particular centers was the convenience it provided the authors due to the presence in these health centers of a department for dialysis that allowed greater access to many potential participants and insights from data collected by the institutions.

Samples/Participants

The sample size included 132 patients undergoing hemodialysis. This was considered ideal for the current study, having been calculated using the Raosoft software (Raosoft, 2004), which suggested 132 as the minimum with a 90% confidence interval. Convenience sampling was used to collect the data. The inclusion criteria were patients diagnosed with ESRD under hemodialysis, at least 18 years old, and able to speak Arabic or English. The exclusion criteria were patients under 18 years undergoing peritoneal dialysis and temporary hemodialysis and exhibiting mental impairments, such as speech or cognitive dysfunction, which could hinder their understanding of the questionnaire.

Instruments

The Beck Depression Inventory (BDI II) was used to assess affective, cognitive, and somatic symptoms of depression, as presented in the Arabic version (Bashir, 2010) translated from the English version by Aaron T. Beck (Beck, 1996). The questionnaire has two components. The first component comprises questions examining five items related to socio-demographic characteristics, including age, sex, marital status, educational level, and living arrangements. The second component includes 21 items measured on a Likert scale ranging from 0 to 3, where '0' signifies an absence of symptoms and '3' represents the presence of severe symptoms. A score of 0–13 indicates minimal depression; 14–19 mild depression; 20–28 moderate depression; and 29–63 severe depression (Jackson-Koku, 2016).

Data Collection

Data were collected face-to-face using a closed-ended questionnaire. The questionnaire included an informative section containing information orienting participants on the primary objective of collecting their responses and other critical knowledge they needed to be aware of before agreeing to have their responses included in the study – informed consent. In addition, the questionnaire gathered data concerning respondents' socio-demographic aspects and symptoms of depression (absent, mild, moderate, or severe) based on the BDI II. Each process lasted between 15 and 20 minutes. The data were collected between August and October 2021.

Data Analysis

Data were analyzed using IBM SPSS Statistical software for Windows version 26.0 (IBM Corp., Armonk, N.Y., USA). Descriptive statistics (mean, standard deviation, frequencies, and percentages) were used to describe the quantitative and categorical variables. As the depression scores did not fulfill the assumption of the normality test, non-parametric statistical tests were used. The Mann-Whitney U-test was used to compare the mean ranks of depression scores in relation to the categorical study variable, which has two categories (gender and living status). In contrast, the Kruskal-Wallis test was used to compare the mean ranks of depression scores in relation to the categorical study variables, which have more than two categories (age groups, marital status, and level of education), followed by the Post-hoc analysis using Conover test. The reliability analysis of the BDI-II scale was carried out using Cronbach's alpha which measures the internal consistency of items. A p-value of <0.05 and 95% confidence intervals were used to report the statistical significance and precision of the results.

Ethical Considerations

The study was approved by Nursing Research Ethics Committee (NREC) at the Faculty of Nursing at King Abdulaziz University (NREC Serial No: Ref No 2M. 66) and the Ministry of Health Institutional Review Board (IRB; IRB No. H-02-J-002; Research No. 1533). In addition, all participants signed an informed consent form prior to data collection containing the aim of the study and a statement that they could withdraw from the study at any stage for any reason. The participants were also informed that the information would be collected for research purposes only and not be used for anything else. Finally, the research did not cause harm or integrate elements that would further exacerbate psychological stress in participants, and their data were anonymized – with no names or medical record numbers published.

Results

Table 1 summarizes the descriptive outcome of the study participants and their socio-demographic characteristics. There were 132 participants, of whom the majority were

between 46 and 65 years old (53; 40.2%), while a few were between 36 and 45 years (20; 15.2%). The majority of the study participants were males (73; 55.3%). About 63% of the participants were married, and most (88.6%) lived with their families. The educational level of the participants was noted as Illiterate (10.6%), three types of school level (primary, middle & secondary - 59.2%), and remaining participants (30.3%) were with bachelor degrees and above.

Table 1 Distribution of socio-demographic characteristics of the participants (*N* = 132)

Characteristics	*n* (%)
Age groups (in years)	
18-35	36 (27.3)
36-45	20 (15.2)
46-65	53 (40.2)
>65	23 (17.4)
Gender	
Male	73 (55.3)
Female	59 (44.7)
Marital status	
Married	83 (62.9)
Single	33 (25.0)
Divorced & Widowed	16 (12.1)
Level of education	
Illiterate	14 (10.6)
Primary school	22 (16.7)
Middle school	20 (15.2)
Secondary school	36 (27.3)
Bachelor and above	40 (30.3)
Living status	
Alone	15 (11.4)
With family	117 (88.6)

The prevalence of four levels of depression among the study subjects is given in **Table 2**, where 56.8% of participants had minimal, 25% with mild, 12.1% with moderate, and only 6.1% of them were suffering from severe depression. The mean depression score of all study subjects was 13.33.

Table 2 Prevalence of depression and mean depression score

Level of depression	*n* (%)	95% CI
Minimal	75 (56.8)	47.90 to 65.39
Mild	33 (25.0)	17.88 to 33.28
Moderate	16 (12.1)	7.07 to 18.91
Severe	8 (6.1)	2.68 to 11.64
Mean (SD): 13.33 (8.92)		

Table 3 presents the descriptive statistics and reliability analysis of each of the 21 items of the BDI-II scale. The mean value of each of the 21 items of the BDI-II scale ranged between 0.07 to 1.51, where 0.07 related to the item of 'Suicidal thoughts/wishes' and 1.51 associated with the item of 'loss of energy'. Only five out of 21 items had a mean value of more than 1.0 (loss of pleasure:1.05; loss of energy: 1.51; changes in sleeping pattern: 1.18; changes in appetite: 1.05 & tiredness or fatigue: 1.32). Out of the 4-point scale responses (0, 1, 2, & 3) to the items, 1 indicated a mild positive response to that item. This indicated that our study participants (patients undergoing hemodialysis) had the above five problems (loss of pleasure, loss of energy, changes in sleeping pattern, changes in appetite, and tiredness or fatigue). The mean values of the remaining 16 items are less than 1.0. The reliability analysis of the 21 items of the BDI-II scale shows a statistically significant internal consistency where the Cronbach's alpha value was found to be 0.866 (p <0.0001), which is more than 0.70, therefore, indicating that the scale has good reliability. Also, the Cronbach's alpha values did not change much if any one of the 21 items were deleted. The corrected item-total correlation values were greater than 0.30, indicating a good correlation of items.

Table 3 Descriptive statistics and reliability analysis of each of the 21 items of the BDI-II scale

Name of BDI-II items	Mean	Standard Deviation	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Sadness	0.58	0.643	0.505	0.859
Pessimism	0.60	0.890	0.582	0.855
Past failure	0.27	0.664	0.511	0.859
Loss of pleasure	1.05	1.040	0.497	0.859
Guilty feelings	0.53	0.824	0.322	0.865
Punishment feelings	0.27	0.604	0.489	0.860
Self-dislike	0.27	0.721	0.366	0.863
Self-criticalness	0.64	0.839	0.449	0.861
Suicidal thoughts or wishes	0.07	0.253	0.503	0.864
Crying	0.68	0.868	0.451	0.861
Agitation	0.45	0.670	0.407	0.862
Loss of interest	0.55	0.935	0.509	0.858
Indecisiveness	0.39	0.760	0.439	0.861
Worthlessness	0.21	0.654	0.510	0.859
Loss of energy	1.51	0.985	0.484	0.860
Changes in sleeping pattern	1.18	0.931	0.407	0.863
Irritability	0.45	0.724	0.467	0.860
Changes in appetite	1.05	0.991	0.421	0.862
Concentration difficulty	0.33	0.843	0.542	0.857
Tiredness or fatigue	1.32	0.868	0.586	0.855
Internal consistency of BDI-II scale = 0.866 (0.831 to 0.897) (p <0.0001)				

Table 4 provides a comparison of the mean ranks of depression scores in relation to the socio-demographic characteristics of the study subjects. A statistically significant difference in the mean ranks of depression scores of males

and females (p = 0.034) was found. That is, females had statistically significantly higher mean depression scores when compared with males. Also, the mean ranks of depression scores were statistically significantly different across study participants among the five levels of education (p = 0.019), where the mean depression scores were significantly higher in the participants who had only primary school level of education when compared with the participants of other levels of education. In addition, the Posthoc analysis shows that the mean depression scores of those with a primary school level of education were statistically significantly higher than the mean depression scores of those with a secondary level of education and subjects with a bachelor degree and above, but not significantly different with mean depression scores of those with illiterate and middle school level of education. Finally, the mean ranks of depression scores were not statistically significantly different in relation to age groups, marital status, and living status of the study participants.

Table 4 Comparison of mean ranks of depression scores in relation to the socio-demographic characteristics

Characteristics	Mean (SD)	Mean ranks	Mann-Whitney U / Kruskal-Wallis	*p*-value
Age groups (in years)			3.033	0.387
18-35	11.64 (10.08)	57.15		
36-45	16.10 (12.99)	72.00		
46-65	13.42 (6.86)	69.36		
>65	13.35 (6.60)	69.76		
Gender			1691.50	0.034*
Male	12.21 (9.57)	60.17		
Female	14.71 (7.92)	74.33		
Marital status			5.55	0.062
Married	13.17 (8.20)	66.39		
Single	11.03 (8.28)	57.73		
Divorced & widowed	18.88 (11.71)	85.16		
Level of education			11.81	0.019*
Illiterate	13.71 (4.94)	73.50		
Primary school	18.09 (8.28)	89.00		
Middle school	12.80 (6.97)	68.58		
Secondary school	12.47 (10.41)	58.86		
Bachelor and above	11.60 (9.21)	57.51		
Living status			875.50	0.989
Alone	14.33 (12.25)	66.63		
With family	13.20 (8.46)	66.48		

*Statistically significant

Discussion

This study aimed to estimate the prevalence of depression symptoms in patients undergoing hemodialysis and examine its association with socio-demographic variables. The two primary objectives were to establish the relationship between hemodialysis treatment and the development of depressive symptoms to validate the general view within the literature that patients with ESRD on maintenance hemodialysis develop depressive symptoms. In addition, the research also sought to establish potential factors of prevalence using socio-demographic factor variables. The study results show a positive association between hemodialysis and depressive symptoms, with loss of energy and tiredness and fatigue being the most significant indicators of depression and the most significant contextual predictors being sex and level of education.

Our study showed that the majority (56.8%) of patients with ESRD on hemodialysis exhibited minimal depression symptoms according to the BDI II. This is significantly lower in comparison with a recent study conducted in Palestine, which found that the prevalence of depression was moderate in 33.9% and severe in 29% of participants, with 19.2% and 17.8% of patients minimally and mildly depressed, respectively (Al-Jabi et al., 2021). This difference in the severity and prevalence of depression might arise because of changes in sample size, tools used to estimate the prevalence of depression, and the patient's cultural background. The positive association between hemodialysis and depression corroborates much of the existing literature on the two variables, affirming that depression is a certain outcome or consequence of hemodialysis (Chan et al., 2017; Semaan et al., 2018; Yang et al., 2021). It is arguably the most common psychiatric illness in patients with end-stage renal disease, which affirms the view that the combination of disturbing physical stress from the disease and psychological distress results in depression (Ma & Li, 2016). Hence, it would be advisable to integrate a psychological intervention aspect or insight when developing a post-treatment regimen for patients on hemodialysis to mitigate or reduce the potential implications of developing depression. Doing so would help identify, determine, and manage various depression levels in patients, with the prospect of developing effective solutions to address and optimize patient outcomes. In addition, it was observed that the risk of developing depressive symptoms increases with the number of treatment sessions an individual undertakes during their prescribed regimen. This aligns with the general view that depressive symptoms are more evident during dialysis (Shafi & Shafi, 2017). As such, the more a patient is exposed to the process and the consequent side-effects of treatment, the more they are susceptible to developing depressive symptoms.

A significant association was found between two socio-demographic variables and determinants of depression susceptibility and severity: sex and level of education. This study concluded that patients are most susceptible to exhibit

higher rates of depression between the ages of 44 and 65 years, which corroborates a recent study conducted in Palestine, in which the depression rate was high in patients aged 60 years and above (Al-Jabi et al., 2021). Furthermore, it has been shown that the older one gets, the more susceptible to depression one gets. This could be mostly due to the lack of engagement and reduced productivity and functionality, with ESRD further limiting the ability of individuals within this age bracket. Matsuzawa et al. (2017) reinforced this rationale by ascertaining that physical exercise has the potential to increase positive effects on physical function for frail individuals.

Our results also showed that sex was a significant factor in depression prevalence, inferring that females are more susceptible and at risk of developing depressive symptoms than males. This finding is in line with the results of other studies that consider depression more predominant in females than males. According to Kuehner (2017), females are five times more likely to develop depression in their lifetime than men, meaning that every ratio of prevalence rate for depression between males and females will more likely be higher for the latter. On the other hand, Athanasiadis et al. (2018) that studies show lower prevalence rates for depression in women, which could be due to many factors, the first being a lack of adequate diagnostic processes to recognize depression in males. Alternatively, there is the view that males have lower social support than females due to misinterpretation of masculinity and social support among males, which leads them to suppress manifesting depressive symptoms or seek help to mitigate or treat their condition (Call & Shafer, 2018).

Finally, the current study also found that one's level of education could influence the prevalence rate of depression for patients with ESRD on hemodialysis. Being with a primary level of school education was found to be significantly related to higher levels of depression reported among this group of hemodialysis patients compared to those of the other educational levels. This finding is in agreement with that of Othayq and Aqeeli (2020) and Gerogianni et al. (2018), who also reported increased depression rates among hemodialysis patients with low levels of education. Furthermore, Semaan et al. (2018) also reported explicitly that illiterate hemodialysis patients had significantly higher depression scores than those with higher levels of education, although this was not the case with our study. Post-hoc analysis of our study showed that the mean depression scores of subjects with a primary school level of education were statistically significantly higher than the mean depression scores of subjects with a secondary level of education and subjects with a bachelor degree and above, but not significantly different with mean depression scores of illiterate subjects and subjects with middle school level of education. Therefore, it is recommended that future studies are conducted using larger sample sizes to confirm the current findings.

The current study results from the BDI II revealed that the most common symptom related to depression in hemodialysis patients was the loss of energy. In contrast, a study conducted in Nepal (Agrawaal et al., 2019) suggested that fatigue was the most common symptom in patients undergoing hemodialysis, experienced by 82% of its participants. In general, these are common symptoms experienced by patients on hemodialysis and may differ from one patient to another. The prevalence of depression and its incidence in patients undergoing hemodialysis treatment remains to be elucidated. Further studies with depressed hemodialysis patients are needed and should focus on the long-term outcomes of the psychological influences of ESRD.

Implications for Nursing Practice

Several critical implications for the nursing practice can be gleaned from this study. The first and most outright implication is that caregivers should be more vigilant in isolating depressive symptoms from uremic symptoms to help provide more specialized and satisfactory care. It follows from a growing need and consequent significance of monitoring and assessing psychiatric symptoms in patients undergoing any treatment, but more so the prevalence of depression in patients with ESRD on hemodialysis. Managing the initial stage of depression may improve outcomes and concordance with treatment. A growing number of studies suggest that nurses should be trained to use psychological scales, particularly in relation to depression symptoms. Training them on using such scales could enable nurses to identify the symptoms early, allowing for enhanced holistic nursing care and subsequently referring patients for further assessment and treatment by psychologists and psychiatrists. Failure to treat psychological issues such as depression diminishes patients' mental health and wellbeing; therefore, proper implementation of screening and diagnosis strategies for depression would be a useful protocol (Semaan et al., 2018).

In addition, the study proves that some groups are more at risk than others, informed by the significant sex and level of education categories. The insights suggest that nursing practitioners for the particular population studied in Jeddah should be concerned mostly with female patients with only primary school education level compared to subjects of other levels of education, as they are considered the most at-risk among patients with ESRD on hemodialysis. The group is an excellent target for educational, prevention, and treatment interventions. Also, understanding various elements and determinants of prevalence would help practitioners develop more appropriate and specialized interventions. Hence, developing competence and leveraging culturally appropriate methods to help patients most likely to develop depression would enhance the perceived quality of care, patient satisfaction, and overall patient outcomes. Such competence may involve the development of interpersonal relationship skills and abilities and cultural competence to equip nurses with operational capabilities to help assess, diagnose, and engage patients for more personalized care (Hackett & Jardine, 2017; Zhang et al., 2021). Hence, nurses will be able to address the specific needs of their patients effectively.

Limitations

This study has some key limitations that might have affected the results. First, the relatively small sample size (n = 132) was an obstacle. The COVID-19 pandemic hindered the ability to include a large number of hemodialysis patients. Numerous hemodialysis centers and hospitals restricted entry to patients only and did not accept IRB applications due to concerns regarding their patients with ESRD. The small sample size affected the diversification of our study group; therefore,

further studies with a greater number of participants are needed. The second limitation of this study was the quarantine period, which adversely affected data collection.

The final limitation was the use of convenience sampling, which increases the risk of bias and limits the generalizability of the study. Although this study reported a low prevalence of depression among hemodialysis patients, early assessment and treatment of depression are needed. Structured assessment tools, early screening, and treatment of depression in hemodialysis patients would improve psychological aspects, health status, and overall patient outcomes, thereby reducing the negative impacts of depression, such as sleep disturbance, fatigue, and decreased daily activity. Moreover, a larger sample size would improve study outcomes in future research. Aside from this, using a qualitative study design might improve the understanding of patients' feelings and experiences, providing more in-depth and detailed research results.

Conclusion

Based on the results of this cross-sectional study, we could draw several conclusions. First, a reasonably low percentage of patients with ESRD undergoing hemodialysis experienced depression. Second, the prevalence of depression was associated with patients' socio-demographic factors, including sex and educational level. Third, a loss of energy and tiredness or fatigue were the most common symptoms correlated with depression, followed by changes in sleeping patterns, loss of pleasure, and changes in appetite in patients undergoing hemodialysis. Finally, the study reveals an urgent need for increased awareness regarding depression associated with hemodialysis treatment among healthcare providers such as physicians, nurses, and specialists.

Declaration of Conflicting Interest

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Authors' Contributions

Conceptualization, SA and ZK; methodology, LSS, RA; software, ZA; validation, LS; formal analysis, SA, RA, ZK, and ZA; investigation, RA; resources, SA, NS; data curation, ZK; writing-original draft preparation, LS; writing-review and editing, FS, LSS; visualization, ZA; supervision, LS, LSS and FA; project administration, SA, ZK, RA, ZA, and LSS. All authors agreed to be accountable for all contents of the study and agreed with the final version to be published.

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Data Availability

The datasets generated during and analyzed during the current study are available from the corresponding author on reasonable request.

References

Abdi, A., Dalvand, S., Vahedian-Azimi, A., Gheshlagh, R. G., & Kurdi, A. (2018). Prevalence of depression among Iranian patients under hemodialysis: A systematic review and meta-analysis. *Journal of Nephropathology*, *7*(4), 224-232. https://doi.org/10.15171/jnp.2018.47

Agrawaal, K. K., Chhetri, P. K., Singh, P. M., Manandhar, D. N., Poudel, P., & Chhetri, A. (2019). Prevalence of depression in patients with chronic kidney disease stage 5 on hemodialysis at a tertiary care center. *JNMA: Journal of the Nepal Medical Association*, *57*(217), 172-175. https://doi.org/10.31729%2Fjnma.4408

Al Awwa, I. A., & Jallad, S. G. (2018). Prevalence of depression in Jordanian hemodialysis patients. *Iranian Journal of Psychiatry and Behavioral Sciences*, *12*(2), e11286. https://dx.doi.org/%2010.5812/ijpbs.11286

Al-Jabi, S. W., Sous, A., Jorf, F., Taqatqa, M., Allan, M., Sawalha, L., Lubadeh, E., Sweileh, W. M., & Zyoud, S. e. H. (2021). Depression among end-stage renal disease patients undergoing hemodialysis: A cross-sectional study from Palestine. *Renal Replacement Therapy*, *7*(1), 1-11. https://doi.org/10.1186/s41100-021-00331-1

AlShahrani, M. A., Alayed, A. S. M., AlShehri, A. H., Solaiman, O., Awadalla, N. J., & Alhomrany, M. (2018). Depression and impaired work productivity among hemodialysis patients in south region of Saudi Arabia. *Saudi Journal of Kidney Diseases and Transplantation*, *29*(5), 1133. https://doi.org/10.4103/1319-2442.243970

Athanasiadis, C., Gough, B., & Robertson, S. (2018). What do counsellors need to know about male depression? *British Journal of Guidance & Counselling*, *46*(5), 596-604. https://doi.org/10.1080/03069885.2017.1346232

Bashir, M. (2010). Adapting Araon T. Beck Depression Inventory (BDI-2) *Arab Psynet Journal*, *25*, 92-105.

Beck, A. T. (1996). *Manual for the Beck Depression Inventory–II*. California: Harcourt Brace & Company.

Call, J. B., & Shafer, K. (2018). Gendered manifestations of depression and help seeking among men. *American Journal of Men's Health*, *12*(1), 41-51. https://doi.org/10.1177%2F1557988315623993

Chan, L., Tummalapalli, S. L., Ferrandino, R., Poojary, P., Saha, A., Chauhan, K., & Nadkarni, G. N. (2017). The effect of depression in chronic hemodialysis patients on inpatient hospitalization outcomes. *Blood Purification*, *43*(1-3), 226-234. https://doi.org/10.1159/000452750

Cohen, S. D., Cukor, D., & Kimmel, P. L. (2016). Anxiety in patients treated with hemodialysis. *Clinical Journal of the American Society of Nephrology*, *11*(12), 2250-2255. https://doi.org/10.2215/CJN.02590316

El Filali, A., Bentata, Y., Ada, N., & Oneib, B. (2017). Depression and anxiety disorders in chronic hemodialysis patients and their quality of life: A cross-sectional study about 106 cases in the northeast of morocco. *Saudi Journal of Kidney Diseases and Transplantation*, *28*(2), 341. https://doi.org/10.4103/1319-2442.202785

Fadzli, N. F. A. M., Rasani, A. A. M., & Keng, S. L. (2021). Assessing the financial burden of hemodialysis treatment in Malaysia. *Belitung Nursing Journal*, *7*(6), 529-534. https://doi.org/10.33546/bnj.1804

Ganu, V. J., Boima, V., Adjei, D. N., Yendork, J. S., Dey, I. D., Yorke, E., Mate-Kole, C. C., & Mate-Kole, M. O. (2018). Depression and quality of life in patients on long term hemodialysis at a national hospital in

Ghana: A cross-sectional study. *Ghana Medical Journal*, *52*(1), 22-28. https://doi.org/10.4314/gmj.v52i1.5

Gerogianni, G., Lianos, E., Kouzoupis, A., Polikandrioti, M., & Grapsa, E. (2018). The role of socio-demographic factors in depression and anxiety of patients on hemodialysis: An observational cross-sectional study. *International Urology and Nephrology*, *50*(1), 143-154. https://doi.org/10.1007/s11255-017-1738-0

Goh, Z. S., & Griva, K. (2018). Anxiety and depression in patients with end-stage renal disease: Impact and management challenges–a narrative review. *International Journal of Nephrology and Renovascular Disease*, *11*, 93-102. https://doi.org/10.2147%2FIJNRD.S126615

Hackett, M. L., & Jardine, M. J. (2017). We need to talk about depression and dialysis: but what questions should we ask, and does anyone know the answers? *Clinical Journal of the American Society of Nephrology*, *12*(2), 222-224. https://doi.org/10.2215/CJN.13031216

Jackson-Koku, G. (2016). Beck depression inventory. *Occupational Medicine*, *66*(2), 174-175. https://doi.org/10.1093/occmed/kqv087

Khan, A., Khan, A. H., Adnan, A. S., Sulaiman, S. A. S., & Mushtaq, S. (2019). Prevalence and predictors of depression among hemodialysis patients: A prospective follow-up study. *BMC Public Health*, *19*(1), 1-13. https://doi.org/10.1186/s12889-019-6796-z

Kuehner, C. (2017). Why is depression more common among women than among men? *The Lancet Psychiatry*, *4*(2), 146-158. https://doi.org/10.1016/S2215-0366(16)30263-2

Lilympaki, I., Makri, A., Vlantousi, K., Koutelekos, I., Babatsikou, F., & Polikandrioti, M. (2016). Effect of perceived social support on the levels of anxiety and depression of hemodialysis patients. *Materia Socio-Medica*, *28*(5), 361-365. https://doi.org/10.5455%2Fmsm.2016.28.361-365

Ma, T. K. W., & Li, P. K. T. (2016). Depression in dialysis patients. *Nephrology*, *21*(8), 639-646. https://doi.org/10.1111/nep.12742

Matsuzawa, R., Hoshi, K., Yoneki, K., Harada, M., Watanabe, T., Shimoda, T., Yamamoto, S., & Matsunaga, A. (2017). Exercise training in elderly people undergoing hemodialysis: A systematic review and meta-analysis. *Kidney International Reports*, *2*(6), 1096-1110. https://doi.org/10.1016/j.ekir.2017.06.008

Nobahar, M., & Tamadon, M. R. (2016). Barriers to and facilitators of care for hemodialysis patients; A qualitative study. *Journal of Renal Injury Prevention*, *5*(1), 39-44. https://doi.org/10.15171%2Fjrip.2016.09

Ormel, J., Hollon, S. D., Kessler, R. C., Cuijpers, P., & Monroe, S. M. (2022). More treatment but no less depression: The treatment-prevalence paradox. *Clinical Psychology Review*, *91*, 102111. https://doi.org/10.1016/j.cpr.2021.102111

Othayq, A., & Aqeeli, A. (2020). Prevalence of depression and associated factors among hemodialyzed patients in Jazan area, Saudi Arabia: A cross-sectional study. *Mental Illness*, *12*(1), 1-5. https://doi.org/10.1108/MIJ-02-2020-0004

Raosoft. (2004). *Sample size calculator*. http://www.raosoft.com/samplesize.html

Ravaghi, H., Behzadifar, M., Behzadifar, M., Taheri Mirghaed, M., Aryankhesal, A., Salemi, M., & Luigi Bragazzi, N. (2017). Prevalence of depression in hemodialysis patients in Iran a systematic review and meta-analysis. *Iranian Journal of Kidney Diseases*, *11*(2), 90-98.

Reyes, M., Fuertes, J. N., Moore, M. T., Punnakudiyil, G. J., Calvo, L., & Rubinstein, S. (2021). Psychological and relational factors in ESRD hemodialysis treatment in an underserved community. *Patient Education and Counseling*, *104*(1), 149-154. https://doi.org/10.1016/j.pec.2020.06.002

Semaan, V., Noureddine, S., & Farhood, L. (2018). Prevalence of depression and anxiety in end-stage renal disease: A survey of patients undergoing hemodialysis. *Applied Nursing Research*, *43*, 80-85. https://doi.org/10.1016/j.apnr.2018.07.009

Shafi, S. T., & Shafi, T. (2017). A comparison of anxiety and depression between pre-dialysis chronic kidney disease patients and hemodialysis patients using hospital anxiety and depression scale. *Pakistan Journal of Medical Sciences*, *33*(4), 876-880. https://doi.org/10.12669%2Fpjms.334.12656

Sriyuktasuth, A., & Phligbua, W. (2021). Risk factors associated with uncontrolled blood pressure among patients with non-dialysis chronic kidney disease in Vietnam. *Belitung Nursing Journal*, *7*(5), 370-379. https://doi.org/10.33546/bnj.1611

Teles, F., Amorim de Albuquerque, A. L., Freitas Guedes Lins, I. K., Carvalho Medrado, P., & Falcão Pedrosa Costa, A. (2018). Quality of life and depression in haemodialysis patients. *Psychology, Health & Medicine*, *23*(9), 1069-1078. https://doi.org/10.1080/13548506.2018.1469779

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: Strengths, weaknesses, and recommendations. *Chest*, *158*(1), S65-S71. https://doi.org/10.1016/j.chest.2020.03.012

World Health Organization. (2021). *Depression*. https://www.who.int/news-room/fact-sheets/detail/depression

Yang, Z.-H., Pan, X.-T., Chen, Y., Wang, L., Chen, Q.-X., Zhu, Y., Zhu, Y.-J., Chen, Y.-X., & Chen, X.-N. (2021). Psychological profiles of Chinese patients with hemodialysis during the panic of coronavirus disease 2019. *Frontiers in Psychiatry*, *12*, 616016. https://doi.org/10.3389/fpsyt.2021.616016

Zhang, Q.-L., Wang, S., Zhang, Y., & Meng, F. (2021). The effect of refined nursing intervention on patients undergoing maintenance hemodialysis in the hemodialysis center during the COVID-19 epidemic. *BMC Nursing*, *20*(1), 1-9. https://doi.org/10.1186/s12912-021-00584-5

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The effect of Benson relaxation application ('Bens app') on reducing fatigue in patients with breast cancer undergoing chemotherapy: A quasi-experimental study

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Abstract

Background: Fatigue is the most common symptom in patients with breast cancer undergoing chemotherapy. Benson's relaxation technique is considered effective to reduce fatigue, but its effect in combination with smartphone technology is limited.

Objective: This study aimed to analyze and determine the effect of the Benson relaxation application (Bens app) on fatigue in patients with breast cancer undergoing chemotherapy.

Methods: A quasi-experimental design with a pretest-posttest comparison group was used. Fifty-six patients were included using consecutive sampling technique, of which 28 were assigned to the experimental group (received Benson relaxation technique using Bens app) and comparison group (obtained Benson relaxation technique using booklet). The Benson relaxation was done two times per day for seven days, and the Brief Fatigue Inventory questionnaire was used to measure the patients' fatigue levels. Data were analyzed using paired and independent *t*-tests.

Results: The experimental group (p = 0.001) and the comparison group (p = 0.015) showed a significant reduction in fatigue after receiving the Benson relaxation for seven days. However, there was a statistically significant difference in fatigue between the experiment and comparison groups after the intervention (t_{55} = 2.481, p = 0.016).

Conclusion: Benson relaxation could reduce fatigue in patients with breast cancer using the Bens app and booklet. However, the Bens app is considered more effective than a booklet. Therefore, the Bens app can be viewed as an alternative to help patients perform Benson relaxation and integrated into the nurse palliative care program for patients with cancer.

Keywords

chemotherapy; mobile health; nursing; relaxation therapy; fatigue; Benson

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Background

Breast cancer is a type of cancer with the highest prevalence. In Indonesia, there were 58,256 new cases of breast cancer in 2018 (Indonesian Ministry of Health, 2018), and chemotherapy is the most widely used treatment. Chemotherapy has been proven to increase the success of treatment at all stages of breast cancer (Vuttanon et al., 2019). However, due to chemotherapy, patients feel many side effects, such as pain, nausea, vomiting, anxiety, alopecia, and fatigue (Ha & Thanasilp, 2021; O'Regan et al., 2019; Wang & Woodruff, 2015).

Fatigue is the most commonly complained symptom in almost all patients with breast cancer undergoing chemotherapy (Oh & Cho, 2020). Fatigue is characterized by several symptoms, i.e., lack of energy, and its symptoms are persistent or not relieving with rest and increase when the patient is undergoing chemotherapy (Al Maqbali et al., 2021).

There are several causes of fatigue in patients with breast cancer, including a decrease in red blood cells (anemia), impaired adenosine triphosphate (ATP) formation, stimulated production of pro-inflammatory cytokines, interleukin (IL) -1β, and tumor necrosis factor (TNF)–α, and HPA axis dysfunction which results in dysregulation of the metabolic and endocrine systems (Wolvers et al., 2018).

Evidently, a previous study showed that 82–96% of fatigue occurs in patients undergoing chemotherapy, or more than 30% of patients who have completed chemotherapy also feel fatigued (O'Regan et al., 2019). In addition, research conducted by Junghaenel et al. (2015) found that the peak of fatigue in patients with breast cancer occurs after the administration of chemotherapy drugs, especially when the patients return home.

In addition, research in Taiwan shows that 45% of patients who experience fatigue did not get proper treatment in the hospital (Rau et al., 2020). Many patients who experience moderate to severe fatigue prefer not to continue their

chemotherapy. However, improperly anticipated fatigue can lead to decreased physical activity, impaired social relationships, emotional disturbances, and decreased cognitive function, reducing the patient's quality of life (Wolvers et al., 2018).

Conceptually, there is no standard to cure fatigue in patients with breast cancer. Therefore, a combination of pharmacological and non-pharmacological approaches is usually used to overcome fatigue in cancer patients. Thus, in this study, the researchers used the Benson relaxation technique in a smartphone to reduce fatigue.

According to literature, Benson relaxation is a mind-body intervention that affects the balance of the posterior and anterior hypothalamus, reduces sympathetic nerve activity, and stimulates catecholamine secretion so that the body will become more comfortable and relaxed (Rambod et al., 2014). Although Jafari et al. (2018) revealed that Benson relaxation significantly reduces fatigue in patients with leukemia, it has never been tried with patients with breast cancer, especially in combination with smartphone applications. The use of smartphone applications is expected to provide an added value that can accommodate Benson's relaxation interventions given to patients by making it easier for patients to understand how to do Benson relaxation, making it easier for patients to follow educational information provided through the applications on the patient's smartphone, and increase patients' independence in performing Benson relaxation. However, the results of this study are expected to be an alternative for oncology nurses to reduce fatigue among patients with breast cancer.

Methods

Study Design

Quasi-experiment with a comparison group design was employed in this study.

Samples/Participants

The target population was patients with breast cancer undergoing chemotherapy. In this study, 65 patients with breast cancer undergoing chemotherapy were selected using a consecutive sampling technique. The sample size was determined based on unpaired numerical comparative test calculations according to Karagozoglu and Kahve (2013), in which the patients were divided into two groups (experiment and comparison groups).

The inclusion criteria of the sample were (1) patients with breast cancer aged > 18 years, (2) owned a smartphone, (3) were able to communicate in and understand the Indonesian language, (4) post-mastectomy, (5) underwent chemotherapy of at least the 2nd cycle, (5) pain scale < 7, and (6) lived with family members. The exclusion criteria were patients who did not have internet access, had hearing loss, and had Benson relaxation. In addition, the criteria for dropout in the study were patients who did not regularly perform Benson relaxation and resigned during the study.

Instruments

A questionnaire and daily checklist were used as the instrument in this study. The questionnaire consisted of (1) patients' characteristics, developed by the researchers, including age, hemoglobin, chemotherapy cycle, education level, long time suffering from cancer, and cancer stage, and (2) Brief fatigue inventory (BFI) questionnaire, consisting of 10 questions to measure patient fatigue: four questions related to the level of fatigue and six questions that focus on the impact of fatigue on the patient's daily life for 24 hours (Paramita et al., 2016). The Indonesian version of the BFI was available in Paramita et al. (2016) with acceptable validity and reliability.

Another instrument was a daily checklist used by family members of the participants as documentation to ensure that the patient performed the Benson relaxation technique. The checklist content consisted of the time (when participants performed Benson relaxation) and the reason why the participants did not perform the relaxation technique.

Interventions

It is noted that both experiment and comparison groups received standard drugs given by the hospital to all patients with chemotherapy, including mefenamic acid, vitamin B, and ranitidine. However, for the experimental group, the Benson relaxation treatment was added as the innovation proposed in this study. The Benson relaxation was carried out using the smartphone-based application (called the Bens app). While for the control group, the Benson relaxation treatment was given using a booklet.

According to the agreement, the patients in both groups were required to perform the Benson relaxation technique regularly twice daily (morning and evening) for seven days in a row. Each session lasted 15 minutes. In addition, in order to comply with the requirement, the researchers involved a family member of each patient to make observations on the patients using a daily checklist whether they did the Benson relaxation technique or not. The researchers also followed up every day using a telephone.

It is also noted that, before conducting the Benson technique, the researchers taught and explained the steps of the method to every patient until they could do it by themselves. In addition, the researchers told the family members how to fill out the checklist to assist the researchers in ensuring all patients followed the instructions accordingly.

The Benson relaxation consisted of the following steps: (1) Sitting or lying down quietly in a comfortable position; (2) Closing eyes; (3) Deeply relaxing all muscles, beginning at the feet and progressing up to the face. Keeping them relaxed; (4) Breathing through the nose. Becoming aware of breathing. Focus on a word, phrase, a short prayer, or only breathing. Suppose choosing, for example, the word "alhamdulillah", when breathing out, saying the word, "alhamdulillah", silently. Breathing easily and naturally; (5) Maintaining a passive attitude and permitting relaxation to occur at its own pace; (6) Continuing for 15 minutes. When finished, sitting quietly for several minutes, at first with eyes closed and later with eyes opened. Do not stand up for a few minutes.

Bens app is a newly developed application in this study. This application is an android based application (Android 5.1 Lollipop OS) that contains Benson relaxation techniques. To use the app, the participants need the Internet. The procedure for developing this application is as follows: (1) Studying the literature to compile the content of the application (Ai et al., 2020; Kayyali et al., 2017; Marques et al., 2020; Poorolajal et

al., 2017; Zhou et al., 2019); (2) Consultation with experts or lecturers in determining the intervention used and health information included in the application to help patients. Three experts in palliative care for cancer were included in this stage; (3) Consultation and process of making Bens app with programmers; and (4) Assessment and evaluation by 25 patients with breast cancer to view content, display applications, use of language, and application functions. The researchers used the mHealth App Usability Questionnaire (MAUQ) (Zhou et al., 2019) to evaluate the app. Usability tests results showed there were three items get the highest average MAUQ score, "I will use this application again" (6.5/7), "Applications that are useful for health and me" (6.5 / 7), "Applications improve my access to health services" (6.5/7). The lowest average score on the item "I can use the application when the internet network is poor or unavailable" (5.28/7).

The Bens app features are (1) an "education" feature about cancer, fatigue, and Benson relaxation techniques; (2) a "Benson relaxation guide" feature using audio (recording); (3) a "reminder" feature that will provide notification via smartphone; (4) "self-monitoring" feature using BFI to measure fatigue; and (5) "documentation" feature of patient usage history of Bens app through a web-based application. The example of the Bens app can be seen in **Figure 1**.

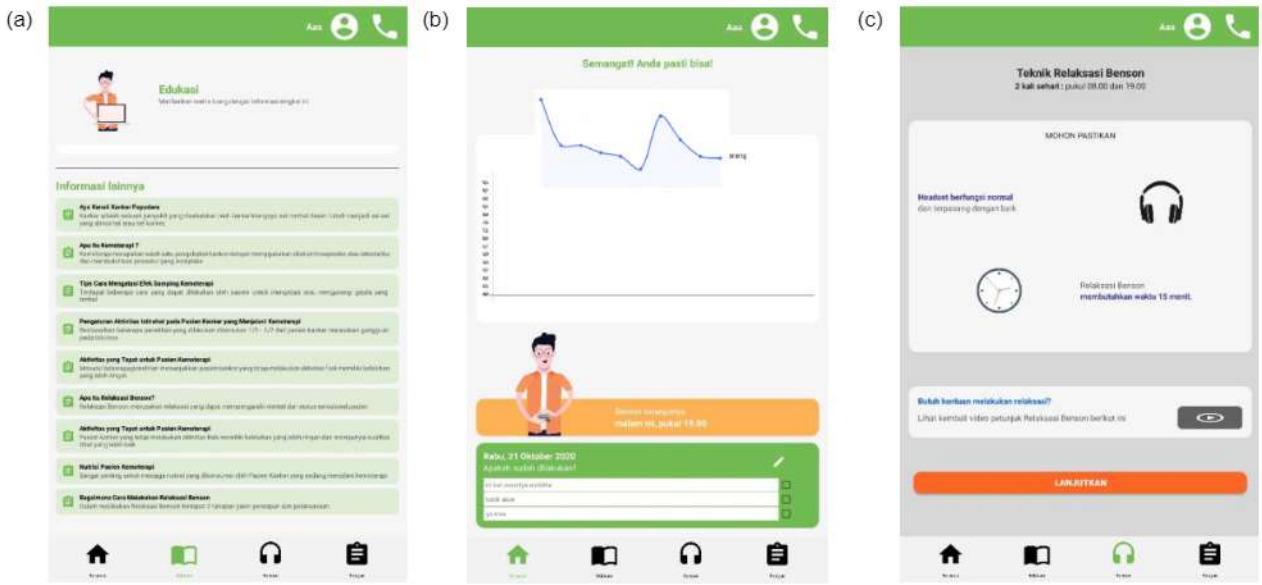

Figure 1 Bens app menu (a) The health education menu that patients can access with the aim of increasing exposure to important information related to chemotherapy; (b) The diagram on the main page is the level of fatigue of the patient after completing the asses

For the comparison group, a booklet was used in conducting the relaxation technique. The booklet contained the definition of Benson relaxation, its four components (quiet environment, comfortable position, mental devices, passive or submissive attitude) (Benson et al., 1975), and the steps to do the Benson relaxation. The example of the booklet can be seen in **Figure 2**. Both the experiment and comparison groups had the same stages of the Benson relaxation technique, only the experimental group used the Benson app, and the comparison group used the booklet.

Figure 2 Benson relaxation booklet

Data Collection

Data were collected by the researchers from June to August 2020 at the chemotherapy unit of Baladhika Husada Hospital Jember, Indonesia, which has a one-day care service. There was no research assistant.

Data Analysis

As data were normally distributed, paired and independent *t*-tests were used to analyze and determine the effect of Ben-Apps on fatigue in patients with breast cancers. All data were analyzed using SPSS version 20.

Ethical Considerations

This research has received research ethics approval from the Faculty of Nursing, Universitas Indonesia, Number SK-76/UN2.F12.D1.2.I/ETIK.2020. The study's aim and procedure were explained to the respondents prior to data collection. Each respondent was asked to sign an informed consent, and they could withdraw at any time without penalty.

Results

Response Rate

Nine patients were dropped out during this research. In the comparison group, three patients did not perform Benson relaxation regularly, and the other three withdrew in the middle of the study. Meanwhile, in the experimental group, two patients did not open the application regularly, and one participant passed away (**Figure 3**). However, the data distribution of the patients' characteristics in the experiment and comparison groups were almost the same. Furthermore, the results of the data normality test with Kolmogorov Smirnov on fatigue showed normally distributed ($p > 0.05$).

Participants' Characteristics

The characteristics of the participants, as shown in **Table 1,** show that the mean age of the participants in the experiment group was 44.82 years and the comparison group was 50.82 years, with a range of 30-60 years. Hemoglobin levels showed almost the same results in both groups, with hemoglobin mean of 11.84gr/dL and 12.48gr/dL, respectively. Forty patients (71.4%) had chemotherapy cycles less than six times. There were 35 (62.5%) patients who had a low education level, 24 (42.9%) patients who had breast cancer for 1-3 years, and 43 (76.8%) had cancer stage III. There was no significant difference in patients' characteristics in both groups (p >0.05).

Table 1 Characteristics of the participants (N = 56)

Variable	Category	Experiment group (n = 28)	Comparison group (n = 28)	Total
		n (%)	*n* (%)	*n* (%)
Chemotherapy cycle	≤ 6 times	21 (75)	19 (67.8)	40 (71.4)
	> 6 times	7 (25)	9 (32.2)	16 (28.6)
Level of education	Low (primary & junior high school education)	15 (26.8)	20 (35.7)	35 (62.5)
	High (senior high school and college level)	13 (23.2)	8 (14.3)	21 (37.5)
Long time suffering from cancer	<1 year	11 (39.3)	9 (32.2)	20 (35.7)
	1-3 years	10 (35.7)	14 (50)	24 (42.9)
	> 3 years	7 (25)	5 (17.8)	12 (21.4)
Cancer stage	Stage II	6 (21.5)	4 (14.2)	10 (17.9)
	Stage III	20 (71.3)	23 (82.2)	43 (76.8)
	Stage IV	2 (7.2)	1 (3.6)	3 (5.4)
Age (Mean ± SD)		44.82 ± 8.08	50.82 ± 5.90	
Hemoglobin (Mean ± SD)		11.84 ± 1.27	12.48 ± 1.25	

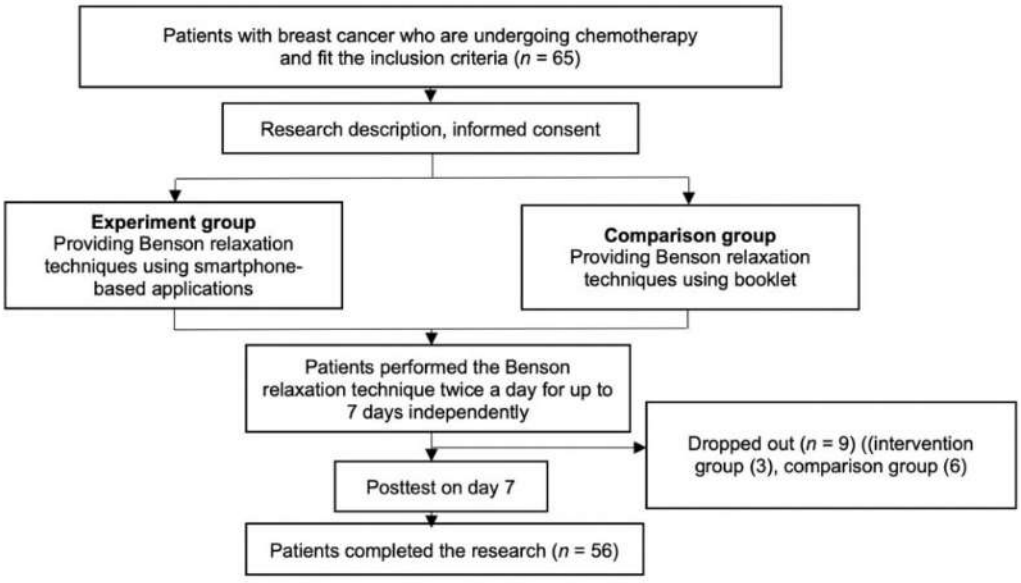

Figure 3 Flow of the study participants

Effect of Intervention on Fatigue

The paired t-test showed that the Benson relaxation had a significant effect on fatigue in both the experimental group that used the Bens app (t_{27} = 6.320, p = 0.001) and the comparison group that used the booklet (t_{27} = 2.592, p = 0.015) (**Table 2**).

The Difference in Fatigue in the Experiment and Comparison Groups

Table 3 shows a statistically significant difference between the experiment and comparison groups before intervention (t_{55} = 1.299, p = 0.115) and after the intervention (t_{55} = 2.481, p = 0.016).

Table 2 Difference in fatigue before and after intervention (*N* = 56)

Fatigue	Comparison group				Experiment group			
	Mean ± SD	*t*	*df*	*p*-value	Mean ± SD	*t*	*df*	*p*-value
Pretest	65.42 ± 8.57	2.592	27	0.015 *	68.03 ± 6.26	6.320	27	0.001 *
Posttest	60.96 ± 8.08				57.67 ± 9.88			

*) significant if α < 0.05 with paired *t*-test

Table 3 Differences in decreased fatigue between experiment and comparison groups (*N* = 56)

Fatigue	Experiment group	Comparison group	Mean difference	*t*	*p-value*
	Mean ± SD	Mean ± SD			
Pretest	68.03 ± 6.26	65.42 ± 8.57	2.60	1.299	0.115
Pretest-Post test	10.35 ± 8.67	4.46 ± 9.09	5.89	2.481	0.016 *

*) significant if α < 0.05 with independent *t*-test

Discussion

This study aimed to determine the effect of the Bens app in reducing fatigue among patients with breast cancer undergoing chemotherapy. The results revealed that there was a significant effect of the Bens app on fatigue and a significant mean difference in comparison with the group that used the Benson booklet only. This indicates that the Bens app is effective to use among patients with breast cancer undergoing chemotherapy.

Theoretically, Benson's relaxation techniques can influence the balance of the posterior and anterior hypothalamus, inhibit sympathetic nerve activity, stimulate catecholamine secretion, and reduce cortisol levels so the patient will feel relaxed (Wulansari & Margawati, 2018). When the patient is in a relaxed state, the response to stress is inhibited, thereby reducing body discomfort, muscle contraction and tension, anxiety, mood disorders, sleep disorders, and fatigue (Rambod et al., 2014; Soheili et al., 2017; Yona & Dahlia, 2020).

The results of this study, however, support the result of Jafari et al. (2018), who conducted a study on the effect of Benson relaxation techniques in reducing fatigue in 20 leukemia patients who were given Benson relaxation two times a day for 14 days.

Benson's relaxation technique can be done properly and correctly if the four essential components (quiet environment, comfortable position, mental devices, passive or submissive attitude) can be adequately fulfilled (Benson et al., 1975). Participants who perform Benson relaxation using the application can start relaxation more calmly. Directions are provided through the guide on the application so that the patient performs the steps in accordance with the sequence. Besides, the respondents are more focused on saying the words that are believed and resigned. This is in line with Höfler et al. (2022) showed that the level of compliance and quality in performing Progressive Muscle Relaxation (PMR) was better in patients who were given PMR using a Smartphone compared to the group given standard hospital care.

The Benson relaxation technique using a smartphone application can be carried anywhere, facilitates access to health information needed by patients, and makes it easier for them to perform Benson relaxation techniques independently with audiovisual guidance. However, all respondents must have a smartphone and good internet access in order to use this app. Internet access is the main problem for respondents when using this application, such as poor signal and audio that stops when the signal is unstable. In the comparison group, a booklet is a simple educational media widely used in health services and cost-efficient. However, the information in the booklets is more limited, and the guidelines for Benson's relaxation techniques are only a form of writing and patient experiences when practicing with the researchers.

The quality of the Benson relaxation technique performed by a patient is influenced by several factors, such as the patient's understanding, regularity in doing Benson relaxation, focus or concentration level in saying the words that are believed, and a calm environment (Benson et al., 1975). The better the quality of Benson's relaxation technique performed by the patient, the greater the therapeutic effect obtained will be.

In our study, the Benson relaxation application has several features, including an "educational" feature to improve patient understanding, a "reminder" in increasing the regularity of patients doing Benson relaxation, and a "Benson relaxation guide" using audiovisual which makes it easier for patients to do it independently, as well as self-monitoring. Most of the patients who performed Benson relaxation techniques using a smartphone application revealed that it was beneficial because they could perform Benson relaxation efficiently, i.e., only using a headset, then playing the guides in the application, and following the directions. In addition, they also received health information that improved their patient insight about the application that can help the participants fulfill four essential components required for carrying out Benson relaxation.

With the findings of this study, the Bens app can be integrated into nursing care plans for cancer management in all hospitals as one of the non-pharmacological interventions to overcome fatigue in patients with cancer. In addition, nurses must have good knowledge about relaxation techniques so that they are able to educate and practice relaxation therapy for patients using the Bens app.

This study has some limitations: first, the study was not a true experimental design. Therefore, the selection bias of the participants might be possible. Therefore, further research with a randomized control trial is needed; second, this application only involved Indonesian participants as a target population; thus, it might only be effective for Indonesians.

Conclusion

Benson relaxation could reduce fatigue in patients with breast cancer using the Bens app and booklet. However, the Bens app was more effective than the booklet, with a statistically significant difference in fatigue reduction. Therefore, the Bens app can be considered one of the alternative media that can be used to help patients in performing Benson relaxation. It can also be integrated with the palliative care program for patients with cancer, but the information regarding the role of nurses, languages, competencies, and health information should be continually updated.

Declaration of Conflicting Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and publication of this article.

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Authors' Contributions

All authors contributed substantial contributions to the study, critically reviewed and revised the manuscript, approved the version to be published, and agreed to be responsible for all aspects of the work. Specifically, study conception and design: HDC, DI, MA. Data collection: HDC, DI, MA. Data analysis and interpretation: HDC, MA. Drafting article: HDC, DI. Critically revised the article: HDC, DI, MA.

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Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

Ai, Z., Gao, X., Zheng, S., & Lu, C. (2020). Variability and influencing factors of QOL in breast cancer patients having chemotherapy. *Clinical Nursing Research*, *29*(8), 571-578. https://doi.org/10.1177%2F1054773818803691

Al Maqbali, M., Al Sinani, M., Al Naamani, Z., & Al Badi, K. (2021). Prevalence of fatigue in patients with cancer: A systematic review and meta-analysis. *Journal of Pain and Symptom Management*, *61*(1), 167-189. https://doi.org/10.1016/j.jpainsymman.2020.07.037

Benson, H., Greenwood, M. M., & Klemchuk, H. (1975). The relaxation response: Psychophysiologic aspects and clinical applications. *International Journal of Psychiatry in Medicine*, *6*(1-2), 87-98. https://doi.org/10.2190/376w-e4mt-qm6q-h0um

Ha, X. T. N., & Thanasilp, S. (2021). Psychometric properties of Quality-of-Life Index for Vietnamese women with breast cancer three weeks postmastectomy. *Belitung Nursing Journal*, *7*(3), 235-245. https://doi.org/10.33546/bnj.1332

Höfler, C., Osmani, F., & Schienle, A. (2022). Placebo effects on the quantity and quality of relaxation training. *Journal of Health Psychology*, *27*(3), 581-588. https://doi.org/10.1177%2F1359105320954238

Indonesian Ministry of Health. (2018). *Riset Kesehatan Dasar [Basic Health Research]*. https://www.litbang.kemkes.go.id/laporan-riset-kesehatan-dasar-riskesdas/

Jafari, H., Janati, Y., Yazdani, J., Bali, N., & Hassanpour, S. (2018). The effect of relaxation technique on fatigue levels after stem cell transplant. *Iranian Journal of Nursing and Midwifery Research*, *23*(5), 388-394. https://doi.org/10.4103%2Fijnmr.IJNMR_26_17

Junghaenel, D. U., Cohen, J., Schneider, S., Neerukonda, A. R., & Broderick, J. E. (2015). Identification of distinct fatigue trajectories in patients with breast cancer undergoing adjuvant chemotherapy. *Supportive Care in Cancer*, *23*(9), 2579-2587. https://doi.org/10.1007/s00520-015-2616-x

Karagozoglu, S., & Kahve, E. (2013). Effects of back massage on chemotherapy-related fatigue and anxiety: Supportive care and therapeutic touch in cancer nursing. *Applied Nursing Research*, *26*(4), 210-217. https://doi.org/10.1016/j.apnr.2013.07.002

Kayyali, R., Peletidi, A., Ismail, M., Hashim, Z., Bandeira, P., & Bonnah, J. (2017). Awareness and use of mHealth apps: A study from England. *Pharmacy*, *5*(2), 33. https://doi.org/10.3390/pharmacy5020033

Marques, V. A., Ferreira-Junior, J. B., Lemos, T. V., Moraes, R. F., Junior, J. R. d. S., Alves, R. R., Silva, M. S., Freitas-Junior, R. d., & Vieira, C. A. (2020). Effects of chemotherapy treatment on muscle strength, quality of life, fatigue, and anxiety in women with breast cancer. *International Journal of Environmental Research and Public Health*, *17*(19), 7289. https://doi.org/10.3390/ijerph17197289

O'Regan, P., McCarthy, G., O'Reilly, S., Power, D., Bird, B. H., Murphy, C. G., & Hegarty, J. (2019). Cancer-related fatigue and self-care agency: A multicentre survey of patients receiving chemotherapy. *Journal of Clinical Nursing*, *28*(23-24), 4424-4433. https://doi.org/10.1111/jocn.15026

Oh, P.-J., & Cho, J.-R. (2020). Changes in fatigue, psychological distress, and quality of life after chemotherapy in women with breast cancer: A prospective study. *Cancer Nursing*, *43*(1), E54-E60. https://doi.org/10.1097/NCC.0000000000000689

Paramita, N., Nusdwinuringtyas, N., Nuhonni, S. A., Atmakusuma, T. D., Ismail, R. I., Mendoza, T. R., & Cleeland, C. S. (2016). Validity and reliability of the Indonesian version of the brief fatigue inventory in cancer patients. *Journal of Pain and Symptom Management*, *52*(5), 744-751. https://doi.org/10.1016/j.jpainsymman.2016.04.011

Poorolajal, J., Ashtarani, F., & Alimohammadi, N. (2017). Effect of Benson relaxation technique on the preoperative anxiety and hemodynamic status: A single blind randomized clinical trial. *Artery Research*, *17*, 33-38. https://doi.org/10.1016/j.artres.2017.01.002

Rambod, M., Sharif, F., Pourali-Mohammadi, N., Pasyar, N., & Rafii, F. (2014). Evaluation of the effect of Benson's relaxation technique on pain and quality of life of haemodialysis patients: A randomized controlled trial. *International Journal of Nursing Studies*, *51*(7), 964-973. https://doi.org/10.1016/j.ijnurstu.2013.11.004

Rau, K.-M., Shun, S.-C., Chiou, T.-J., Lu, C.-H., Ko, W.-H., Lee, M.-Y., Huang, W.-T., Yeh, K.-H., Chang, C.-S., & Hsieh, R.-K. (2020). A nationwide survey of fatigue in cancer patients in Taiwan: An unmet need. *Japanese Journal of Clinical Oncology*, *50*(6), 693-700. https://doi.org/10.1093/jjco/hyaa038

Soheili, M., Nazari, F., Shaygannejad, V., & Valiani, M. (2017). A comparison the effects of reflexology and relaxation on the psychological symptoms in women with multiple sclerosis. *Journal of Education and Health Promotion*, *6*, 11. https://doi.org/10.4103%2Fjehp.jehp_166_14

Vuttanon, N., Finnegan, L., Lojanapiwat, B., Sittisombut, S., Meechamnan, C., & Dhatsuwan, J. (2019). Effect of progressive muscle relaxation on symptom clusters in breast cancer patients receiving chemotherapy: A quasi-experimental controlled trial. *Complementary Therapies in Clinical Practice*, *37*, 27-31. https://doi.org/10.1016/j.ctcp.2019.08.004

Wang, X. S., & Woodruff, J. F. (2015). Cancer-related and treatment-related fatigue. *Gynecologic Oncology*, *136*(3), 446-452. https://doi.org/10.1016/j.ygyno.2014.10.013

Wolvers, M. D. J., Bussmann, J. B. J., Bruggeman-Everts, F. Z., Boerema, S. T., van de Schoot, R., & Vollenbroek-Hutten, M. M. R. (2018). Physical behavior profiles in chronic cancer-related fatigue. *International Journal of Behavioral Medicine*, *25*(1), 30-37. https://doi.org/10.1007/s12529-017-9670-3