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Effectiveness of GIANESIA (guided imagery in Indonesian) mobile application for reducing anxiety in preoperative patients†

Original article

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Abstract: **Objective:** The use of technology is growing rapidly. It can also be used in nursing interventions. A technology pack can support nursing interventions. An application called guided imagery in Indonesian (GIANESIA) has been developed to reduce anxiety in preoperative patients.

Methods: A total of 42 participants joined this research. The respondents were those who would undergo surgery. We used the numeric visual analog anxiety scale (NVAAS) as the instrument to measure their anxiety levels. The participants were first given informed consent. Then, they open the application that has been installed. The process begins with participants choosing their initial anxiety score. Later, they start the therapy session, and immediately after finishing it, a pop-up bar prompts them to enter their final, posttherapy anxiety score.

Results: This study shows the effectiveness of therapy given by GIANESIA in reducing anxiety in preoperative patients with p-value = 0.000 ($\alpha < 0.05$). Also, 61.9% of the participants had decreased anxiety levels after therapy with GIANESIA.

Conclusions: This study proves that providing therapy via a mobile application is effective in easing uncomfortable feelings, especially anxiety, in preoperative patients. Moving forward, the app can and should be expanded with new features and further developmental goals.

Keywords: *anxiety • application • GIANESIA • guided imagery • mobile • preoperative*

1. Introduction

Surgery is an invasive medical procedure that involves cutting through body tissues, which can be a major source of stress for patients. Among the different stages of surgery, the preoperative period is often the most psychologically challenging. High levels of anxiety before surgery have been shown to intensify postoperative pain.[1] Anxiety itself is described as an uncomfortable emotional state triggered by mental tension or worry.[2] During this preoperative period, patients commonly experience a combination of emotional distress,

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cognitive strain, and physiological reactions.[3] Preoperative anxiety might affect surgery outcomes. The previous research by Villa et al. found that stress, anxiety, and depression are closely linked to a higher risk of postoperative complications.[4] The surgical procedure may affect not only psychological but also physiological stress in patients. Anxiety, in particular, can cause noticeable physical changes, such as an increase in respiratory rate, blood pressure, and heart rate.[5] Anxiety responses in individuals are the presence of autonomic change related to sympathetic neuron hyperactivation.[6] Individuals who are more sensitive to stress tend to react strongly to acute stressors, such as the preoperative period. This heightened anxiety can be triggered by various factors, including hospitalization, the anticipation of surgery, fear of pain, or concerns about the progression of their illness. If not properly managed, preoperative anxiety may delay the healing process or prolong the duration of hospitalization.[7] Moreover, it can increase the risk of complications and morbidity during or after surgery.

According to the Indonesian Ministry of Health, approximately 148 million patients undergo surgical procedures each year.[8] When preoperative anxiety is not properly addressed, it can lead to serious consequences, including surgery cancellations and deterioration of the patient's physical condition. Data from Fatmawati Central General Hospital in 2012 showed that among 10% of preoperative patients, 5% experienced surgery cancellations due to elevated blood pressure, 2% were unable to proceed because of menstruation, and 3% canceled out of fear or because their families refused the procedure.[9] Similarly, a study conducted at Dr. Wahidin Sudirohusodo Central General Hospital in Makassar found that out of 30 preoperative patients, 13 experienced severe anxiety, 14 had moderate anxiety, and only 3 showed mild anxiety.[10] These findings highlight that preoperative anxiety remains a persistent and significant challenge in surgical care.

One of the most common factors contributing to preoperative anxiety is the fear of potential complications. Studies have shown that female patients generally experience higher levels of anxiety compared to male patients. A lack of adequate information about the surgical procedure also tends to heighten anxiety levels. Among the various concerns, pain is one of the most feared complications. Many patients vividly imagine the pain from surgical wounds even before the procedure begins, which further intensifies their preoperative distress. In addition, several other factors can contribute to preoperative anxiety, including fear of death, potential physical disability, financial burdens, and the stress of adapting to a new environment.[1] The unfamiliar and often cold atmosphere of the operating room, combined with the presence of numerous surgical instruments, can further heighten a patient's anxiety before and during the procedure.

Nonpharmacological therapy can be an effective option for managing preoperative anxiety. While pharmacological interventions are sometimes used before surgery, they may cause undesirable side effects. For this reason, nondrug approaches are often considered safer and more beneficial. One such method is guided imagery, a relaxation technique that uses visualization to help patients shift their focus away from fear and discomfort. This approach has been proven effective in reducing anxiety levels in preoperative patients.[11] However, guided imagery is still not widely applied in clinical practice because each session typically requires a significant amount of time.

There is a growing need for innovative approaches to enhance the quality of nursing interventions. One such innovation is Guided Imagery in Indonesian (GIANESIA), a mobile-based audio therapy application designed to help manage patient anxiety. In today's digital era, mobile phones have become an essential part of daily life, making this technology easily accessible to most people. GIANESIA can be used flexibly, either in a hospital setting as part of preoperative care or at home, allowing patients to experience guided imagery therapy in a more convenient and comfortable way. GIANESIA offers a practical therapeutic option that is more effective, efficient, and easy to use. This application can greatly assist nurses and other healthcare professionals in managing preoperative anxiety without requiring extensive time or resources. By integrating GIANESIA into patient care, healthcare workers can provide timely anxiety relief, making the preoperative process smoother and more comfortable for patients.

2. Methods

This study was carried out at a nongovernment hospital in Jember, Indonesia, involving a total of 42 participants. A cross-sectional research design was employed, with inclusion criteria consisting of participants aged 18 years or older, willingness to participate in the study, being in the preoperative phase, and the ability to operate an Android smartphone. This study was conducted from June to August 2021, during a period of rising coronavirus disease 2019 (COVID-19) cases in Indonesia. A quasi-experimental 1-group pretest and posttest design was applied to evaluate the intervention. Guided imagery therapy using the GIANESIA application was provided within 24 h prior to surgery. This intervention aimed to help participants achieve a greater sense of calm and relaxation, allowing them to rest more comfortably before undergoing

the procedure. Participants were first asked to provide informed consent before receiving the intervention through the GIANESIA application. The researcher began by ensuring that each participant was indeed experiencing preoperative anxiety. After confirmation, a brief explanation was given on how to operate the app and the available features. Participants then practiced using the application independently and selected their preferred therapy. Before starting the session, the researcher asked participants whether any of the available settings might trigger past trauma. This step was essential to ensure that the participants remained in a positive emotional state and to maximize the therapeutic effect. Each guided imagery session in the GIANESIA app lasted approximately 7 min. The nurse provided the patient with a mobile phone equipped with the application and a pair of headphones. Once the therapy began, the nurse stepped away, allowing the patient to relax in privacy and feel more at ease. After the session was completed, the nurse returned to conduct an evaluation. Participants were then asked to share their responses and levels of anxiety before and after receiving the therapy through the GIANESIA application.

The instrument used in this study was the numeric visual analog anxiety scale (NVAAS), which is designed to assess the level of anxiety experienced by patients. NVAAS combines a numeric scale with a visual analog scale, ranging from 0 (no anxiety) to 10 (the worst anxiety imaginable). This tool has been previously validated and proven reliable for use in patients undergoing surgical procedures. Furthermore, NVAAS has shown a significant correlation with both the State-Trait Anxiety Inventory (STAI)-trait anxiety and VAS, with correlation coefficients of 0.64 ($P < 0.05$) and 0.35 ($P < 0.038$), respectively, supporting its accuracy and consistency as a measurement instrument.[12] The anxiety assessment instrument was integrated directly into the GIANESIA application, allowing participants to self-assess their anxiety levels easily. Upon opening the app, participants were prompted to rate their anxiety on a scale from 1 to 10, accompanied by corresponding emoticons ranging from a happy face (low anxiety) to a sad face (high anxiety). Higher numbers with sad emoticons represented more severe anxiety, while lower numbers with happy emoticons indicated minimal anxiety. After completing the initial assessment, participants proceeded to the therapy section. Once the guided imagery session ended, a pop-up bar appeared, asking them to provide their final anxiety rating. Anxiety scores were then categorized as follows: 1–3 = mild anxiety, 4–6 = moderate anxiety, and 7–10 = severe anxiety. To evaluate the effectiveness of the intervention, the data collected before and after therapy were analyzed using a *t*-test, comparing the preintervention and postintervention anxiety scores.

3. Results

3.1. Participant's characteristics

Table 1 presents the demographic characteristics of the participants. The majority of participants were female (64.3%), and the largest age group was 18–25 years old (38.1%). In terms of educational level, most participants had completed senior high school (40.5%), and 81% of the surgical procedures were categorized as minor surgery.

3.2. The effectiveness of the GIANESIA app in reducing anxiety preoperative

Table 2 illustrates the participants' anxiety levels before and after receiving therapy through the GIANESIA application. Prior to the intervention, most participants experienced moderate anxiety (61.9%), with scores ranging from 4 to 6. Following the therapy session, the majority of participants reported mild anxiety (81%), corresponding to scores between 1 and 3. This shift indicates a clear reduction in anxiety levels after using the GIANESIA app. These findings indicate that the majority of participants experienced a notable reduction in anxiety levels after receiving therapy through the

Variable	N	%	SD
Gender			0.485
Man	15	35.7	
Woman	27	64.3	
Age (years old)			0.963
18–25	16	38.1	
26–45	13	31	
46–65	10	23.8	
>65	3	7.1	
Education			0.963
Elementary	2	4.8	
Junior high	4	9.5	
Senior high	17	40.5	
Diploma	3	7.1	
Bachelor	14	33.3	
Master	2	4.8	
Surgery type			0.397
Minor	34	81	
Mayor	8	19	

Note: SD, standard deviation.

Table 1. Characteristics of the participant.

Variable	Mild anxiety		Moderate anxiety		Severe anxiety		Total		SD	*P* value
	n	%	n	%	n	%	n	%		
Before therapy	12	28.6	26	61.9	4	9.5	42	100	1.289	0.000
After therapy	34	81	8	19	0	0	42	100	1.167	

Note: GIANESIA, guided imagery in Indonesian; SD, standard deviation.

Table 2. The effectiveness of the GIANESIA app in reducing anxiety.

GIANESIA application. Statistical analysis showed a significant effect, with a *P*-value of 0.000 ($\alpha < 0.05$), confirming that the intervention had a meaningful impact on anxiety reduction. Based on the data, 9.5% (4 participants) showed a decrease in anxiety from severe to moderate, while 52.3% (22 participants) experienced a decrease from moderate to mild anxiety. In total, 61.9% (26 participants) reported a reduction in their anxiety levels following the guided imagery therapy, demonstrating the effectiveness of the GIANESIA app as a supportive preoperative intervention.

4. Discussions

Anxiety is a common emotional response among patients awaiting surgery. In this study, 61.9% of respondents experienced moderate preoperative anxiety, 28.6% reported mild anxiety, and 9.5% experienced severe anxiety. This means that the majority of patients had anxiety levels in the moderate range, with scores between 4 and 6. These findings are consistent with previous research, which also reported elevated levels of preoperative anxiety using the STAI, where scores above 44 indicated a high level of anxiety. This alignment reinforces the notion that preoperative anxiety is a widespread and significant concern that requires effective management strategies. Although the instruments used in these studies differ, the results consistently show that most preoperative patients experience high levels of anxiety. Several factors may contribute to this condition, including a lack of adequate information about the surgical procedure, fear of anesthesia, concerns about the physical impact of surgery, worries about the recovery process, and anxiety about potential medical errors by doctors or nurses.[2,13]

Our findings showed that the majority of participants in this study were female (64.3%). This aligns with previous research, which has identified female gender as a risk factor for preoperative anxiety.[13] Women are generally more prone to overthinking and worrying, which may contribute to higher anxiety levels before surgery. Most participants in this study were also in the 18–25-year-old age group. Consistent with earlier studies, individuals under the age of 50 years tend to exhibit a stronger correlation with preoperative anxiety, suggesting that younger patients may be more vulnerable to emotional distress prior to surgery. A negative correlation was observed between age and preoperative anxiety, indicating that younger patients tend to experience higher levels of anxiety.[14] This may be attributed to the fact that older individuals are generally more emotionally mature and mentally prepared to face surgical procedures, making them less susceptible to preoperative distress compared to younger patients.

In addition to age and gender, the type of surgery is also an important factor influencing preoperative anxiety. In this study, 81% of participants underwent minor surgery. Minor surgery typically involves less invasive procedures, limited to the skin or superficial tissues. In contrast, major surgery involves more complex and invasive interventions, such as entering body cavities or removing organs.[15] This finding is supported by previous research showing that patients undergoing minor surgeries tend to have higher Visual Analog Scale (VAS) scores compared to those undergoing major surgeries.[14] One possible explanation is that patients scheduled for major surgery often receive more detailed information, preparation, and counseling beforehand due to the higher risks involved. In contrast, minor surgery may be perceived as less serious, leading to less preoperative education and psychological preparation, which can actually increase patient anxiety.

Most participants experienced a decrease in their anxiety levels after receiving therapy through the GIANESIA application, with many shifting from severe to moderate anxiety and from moderate to mild anxiety. Although the numerical reduction in scores was not exceptionally large, participants reported feeling more comfortable and relaxed following the intervention. These findings are consistent with previous studies demonstrating the effectiveness of guided imagery therapy. Guided imagery is a relaxation technique that helps individuals achieve a sense of calm and inner peace by engaging the mind in positive visualization. This therapy involves mentally picturing serene or joyful settings—such as a beach, forest, or mountain—which helps relax both the mind and body, ultimately reducing stress and anxiety. Guided imagery is a relaxation technique that uses imagination to create positive psychological and physiological effects.[16,17] This method can involve visual,

auditory, or even olfactory stimuli to enhance the immersive experience.[18] The therapy begins with participants taking 3 deep breaths to help their bodies and minds relax. It is essential to conduct the session in a quiet, distraction-free environment, and the use of headphones is recommended to help participants fully focus on the audio. They are then instructed to close their eyes and listen attentively to the guided imagery session. After the therapy, participants shared their immediate impressions with the researcher. Many expressed that they felt calmer, more relaxed, and experienced a more positive mindset, indicating that the guided imagery session effectively helped ease their preoperative anxiety.

Nonpharmacological treatments, such as guided imagery, have long been used in nursing interventions and are typically delivered manually. By modifying guided imagery into a mobile technology-based therapy, it can be integrated more effectively into nursing care, offering a more practical and accessible approach for both patients and healthcare providers. Conducting usability studies on this kind of innovation is crucial, as it highlights the potential of nonpharmacological or complementary therapies in clinical settings. The GIANESIA app, in particular, shows promise in helping preoperative patients reduce anxiety before surgery. In today's digital era, integrating healthcare services with technology is becoming essential, making mobile-based interventions a valuable tool in modern nursing practice. The GIANESIA app represents a genuine innovation in nursing, pushing us toward excellent future patient service. To prove its worth, we conducted a usability test, and the results were overwhelmingly positive: 97.6% of users reported high **s**atisfaction with the app's features. Furthermore, the system usability score (SUS) was well over 68, confirming that the app is robust enough for a large-scale audience.[19]

This study shows an effective result in which therapy by GIANESIA can be used for reducing preoperative anxiety (P-value = 0.000; $\alpha < 0.05$). This result is in line with the previous study to evaluate the effect of guided imagery therapy on anxiety level and cortisol. It shows statistically significant anxiety reduction with P value = 0.005 and lower cortisol levels with P value <0.001 after intervention.[20] In general, manual guided imagery therapy takes about 18–20 min.[21] Ultimately, the GIANESIA app makes delivering guided imagery therapy simple and fast, allowing nurses to save precious time in their daily routines. The therapy within the app lasts approximately 7 min. Patients simply listen using headphones, and the nurse should leave the room to ensure the environment remains peaceful and comfortable. The voice quality itself is designed to mirror the calm, guiding tone of a nurse delivering the therapy manually. However, the GIANESIA app enhances this experience significantly by layering a calming mix of guided voice instruction and natural soundscapes. For this study, the audio was developed with 2 distinct options: forest vibes and beach vibes. This option lets the user choose a scene that avoids any site where they may have experienced trauma. The audio gently leads participants to vividly imagine being in that place, feeling the soft sand between their toes, listening to the birds' chirp, and watching the blue sky meet the ocean. The guidance continues, helping them achieve a deep state of comfort, peace, and relaxation, free from any worries or anxiety. Finally, they are instructed to slowly open their eyes and simply hold onto that pleasant, comfortable feeling.

The GIANESIA mobile app is designed to streamline care, making it significantly easier for nurses to administer guided imagery as an intervention. By shortening treatment time and lightening their workload, the app helps improve the overall quality of patient service. Unlike most similar applications on the Play Store, which are primarily in English, GIANESIA specifically addresses a critical need: delivering therapy in the user's native tongue. By offering GIANESIA, the app ensures that local patients can fully understand and benefit from the audio therapy. Furthermore, its continuous availability allows users to manage anxiety for various issues, both in the hospital and at home.

Consequently, the number of available preoperative patients dropped significantly. This was likely due to patients' fear of contracting COVID-19 simply by coming to the hospital for their scheduled procedures. The researchers' goal was to recruit as many participants as possible over a 3-month period. While the GIANESIA therapy proved effective at reducing the need for preoperative therapy, the app's usability requires further upgrades. This could involve increasing the variety of voice choices and features, or even integrating a complementary therapy directly into the application. Additionally, adding a live-chat feature would be beneficial for users who need a consultation or advice on which therapy best suits their specific needs.

5. Conclusions

The GIANESIA application has shown a significant impact in reducing anxiety among preoperative patients. This demonstrates that technology-based therapy can be effectively implemented in hospital and clinical settings for a wide range of patients. The use of the GIANESIA app highlights the practical value of integrating digital tools into nursing interventions**,** offering a modern, efficient, and patient-centered approach to anxiety management. This innovation reflects a meaningful step forward in enhancing clinical nursing

practices through the use of accessible technology. Technology can play an important role in supporting nurses in their daily practice and enhancing the quality of patient care. Guided imagery therapy delivered through the GIANESIA application can serve as a valuable tool to assist nurses in managing patients' anxiety more efficiently. By using this app, nurses can save time, reduce workload, and minimize burnout, as the intervention requires less direct supervision compared to traditional methods. Moreover, the app enables the delivery of therapies that are often difficult to implement in busy hospital settings due to time constraints or limited resources. Although the duration of the therapy's effect before surgery and potential external distractions may vary, GIANESIA provides patients with a new and positive preoperative experience, making them feel calmer and more prepared for their procedures. Patients won't just receive physical treatment; they will also find comfort and support for their psychological symptoms.

Ethical approval

Ethical approval was obtained from the ethics committee of Universitas dr. Soebandi with the approval number 043/KEPK/SDS/V/2021.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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