

**EFFECT OF EDUCATION AND COUNSELLING ON REDUCING
PAIN AND ANXIETY IN WOMEN UNDERGOING
HYSTEOSALPINGOGRAPHY: A RANDOMISED
CONTROLLED TRIAL**

BY

**LAOYE FUNMILAYO
BENEDICTA BMS2010668**



**DEPARTMENT OF
RADIOGRAPHY SCHOOL
OF BASIC MEDICAL
SCIENCES UNIVERSITY OF
BENIN, BENIN CITY**

OCTOBER, 2025

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**DEPARTMENT OF RADIOGRAPHY, SCHOOL OF BASIC MEDICAL
SCIENCES, UNIVERSITY OF BENIN CITY, EDO STATE.**

**BEING A PROJECT SUBMITTED TO THE DEPARTMENT OF
RADIOGRAPHY IN PARTIAL FULFILMENT FOR THE REQUIREMENT
OF THE AWARD OF BACHELORS DEGREE IN RADIOGRAPHY
UNIVERSITY OF BENIN, BENIN CITY, NIGERIA.**

OCTOBER, 2025.

CERTIFICATION

This is to certify that this research project by **LAOYE FUNMILAYO BENEDICTA** with a Matriculation Number of BMS2010668 has been examined and approved for the award of Bachelors of Radiography in the department of Radiography; School of Basic Medical Science, University of Benin, Benin City.

DR. AKPOBASAHAN E. A
(Project Supervisor)

Sign and date

MRS IGBINEDION F.O
(Head of Department)

Sign and date

EXTERNAL EXAMINER.

Sign and date

DEDICATION

I dedicate this project to God Almighty the giver of knowledge for His grace and mercy upon my life

ACKNOWLEDGEMENT

First and foremost, I offer my heartfelt thanks to the Almighty for blessing me with the strength, insight, and resilience needed to complete this research successfully.

I am profoundly grateful to my amazing and caring parents, Mr. and Mrs. Laoye, as well as my beloved siblings, Adeyemi, Oladele, and Wale Laoye, for their unwavering support—both emotional and financial. Their encouragement has been invaluable, not only in my academic pursuits but in all aspects of my life. My academic journey would have been incomplete without their continuous love, care, and backing.

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ABSTRACT

Hysterosalpingography (HSG) is a relatively simple, safe, and minimally invasive radiological examination used to visualize the uterine cavity and fallopian tubes through the introduction of a contrast medium. Beyond its diagnostic value, HSG also offers therapeutic benefits in the assessment and management planning of infertility. This randomized controlled trial was conducted to determine how pre-procedure education and counseling influence pain perception and anxiety levels among women undergoing HSG. A total of sixty-nine (69) women were selected using a purposive sampling method to ensure appropriate representation of individuals scheduled for the procedure. Data collection involved a structured questionnaire, the Visual Analog Scale (VAS) for assessing pain intensity, and the State-Trait Anxiety Inventory (STAI) for evaluating anxiety before, during, and after the examination. All collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Socio-demographic analysis showed that 25 participants (36.2%) were between 20–29 years, 24 (34.8%) were aged 30–39 years, and 20 (29.0%) fell within 40–49 years. Regarding educational attainment, 44 respondents (63.8%) had university or postgraduate qualifications, whereas 25 (36.2%) had only primary or secondary school education. The majority, 53 women (76.8%), were married. Of the participants, 35 (50.7%) were assigned to the intervention group and received comprehensive information about the HSG procedure, while 34 (49.3%) formed the control group and did not receive such guidance. Within the intervention group, 32 women (91.4%) reported that the education and counseling were extremely beneficial, while the remaining 3 (8.6%) found them moderately helpful. Pain assessment revealed that in the control group, 58.8% experienced moderate pain and 41.2% reported severe pain. Conversely, among the intervention group, 82.9% reported only mild pain and 17.1% experienced moderate pain. Anxiety levels followed a similar pattern: 67.7% of the control group exhibited high anxiety, whereas 88.6% of the intervention group reported minimal anxiety. Hypothesis testing indicated that all comparisons between the control and intervention groups yielded p-values less than 0.05, signifying statistically significant differences. Therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted.

KEYWORDS: Education, Counseling, Pain, Anxiety, Hysterosalpingography.

CHAPTER ONE

INTRODUCTION

Hysterosalpingography (HSG) is a straightforward, low-risk, and minimally invasive radiologic technique used to visualize the uterine cavity and fallopian tubes after introducing a contrast medium. It serves both diagnostic and therapeutic purposes, particularly in assessing infertility and guiding appropriate management options (Dreyer et al., 2019). According to the National Institute for Health and Care Excellence (NICE), HSG is recommended as a primary tool for evaluating tubal blockage in women undergoing fertility assessment (NICE guidelines, 2023). The infertility evaluation process itself often triggers significant anxiety among couples (Park et al., 2024), with women undergoing in vitro fertilization experiencing even higher levels of emotional distress (Su, Tzeng & Kuo, 2019). Numerous studies indicate that HSG is commonly linked to considerable anxiety, discomfort, and stress for various reasons, and the procedure is widely perceived as painful and unpleasant (Erkılınç et al., 2018; Handelzalts et al., 2016; Hindocha et al., 2015; Safi et al., 2019).

1.1 BACKGROUND OF STUDY

Multiple studies have shown that women undergoing HSG often report moderate to intense pain, particularly at the stages involving speculum insertion and the injection of contrast medium into the uterine cavity (Kiykac Altınbas et al., 2020). Beyond the physical discomfort, the emotional strain triggered by anticipating pain, fear of what the procedure entails, and worry about test outcomes—especially among women facing infertility—greatly shapes the overall procedural

experience (Ting et al., 2021). Anxiety may further amplify pain perception, creating a reinforcing cycle that elevates both psychological distress and physiological stress responses.

In recent years, non-pharmacological strategies such as pre-procedure education and psychological counselling have gained recognition as promising, cost-effective approaches for lowering pain and anxiety during invasive procedures like HSG. Educational interventions equip patients with essential information about the process, expected sensations, and procedural steps, thereby reducing uncertainty and perceived risk. Counselling helps manage emotional distress, enhances mental preparedness, and strengthens coping abilities (Efe et al., 2018). Previous research across other clinical settings—such as colonoscopy, mammography, and childbirth—indicates that patient education can meaningfully reduce anxiety and improve overall procedural outcomes (Asilioglu & Celik, 2021). Despite this evidence, there is still a noticeable scarcity of robust randomized controlled trials that specifically examine the combined impact of education and counselling on women undergoing HSG, particularly in sub-Saharan Africa, where cultural norms and varying levels of health literacy may affect pain perception and healthcare-seeking behaviors. In light of this gap, the present study aims to assess how structured educational and counselling interventions influence pain and anxiety among women undergoing HSG using a randomized controlled trial (RCT) framework. The intervention is anticipated to improve procedural knowledge, mitigate anticipatory anxiety, and ultimately reduce pain during the examination.

The findings from this research hold significant value for enhancing patient-centered care within radiology and gynecology practices. Should the intervention prove beneficial, incorporating

routine education and counselling into pre-HSG preparation could increase patient satisfaction, streamline procedural processes, and contribute to better-quality reproductive healthcare services.

1.2 STATEMENT OF THE PROBLEM

Pain during HSG typically reaches its maximum immediately after the contrast medium is introduced and continues for several minutes, but it then rapidly subsides between five and ten minutes post-procedure. By the 30-minute mark, most women describe the sensation as mild discomfort rather than true pain (Hindocha et al., 2015). The discomfort associated with HSG is linked to several physiological factors, including traction on the cervix, distension of the uterine cavity, and irritation of the peritoneum caused by the contrast agent (Szymusik et al., 2015). In addition to these physical causes, psychological elements such as anxiety and depression have been shown to influence how pain is perceived during gynecological procedures (Cicinelli, 2019; Tokmak et al., 2015). Anxiety often arises from fear, unfamiliarity, and uncertainty surrounding invasive medical examinations. Interventions such as patient education and counseling have demonstrated effectiveness in reducing anxiety and minimizing the pain experienced during painful invasive procedures (Balci et al., 2021; Hanprasertpong et al., 2023; Tokmak et al., 2015). However, only a small number of studies have specifically targeted anxiety reduction among women undergoing HSG (Agwu & Okoye, 2017; Erkılınç et al., 2018; La Fianza et al., 2024). Previous interventions—including music therapy (Agwu & Okoye, 2017), structured educational and counseling sessions (La Fianza et al., 2024), and video-based teaching (Erkılınç et al., 2018)—have shown promise in lowering anxiety related to HSG. Anxiety has also been identified as a contributor to increased pain levels in other invasive reproductive procedures

(Bot-Robin et al., 2020; Handelzalts et al., 2016; Tokmak et al., 2015), and heightened pain can compromise patient cooperation during HSG (Szymusik et al., 2015).

Several pharmacological and procedural approaches have been explored to control pain during HSG, such as comparing water-based versus oil-based contrast media (Lindequist et al., 2015); administering paracervical blocks (Hacivelioglu et al., 2024); evaluating different analgesics (Karasahin et al., 2019; Unlu et al., 2015); and using various cannulation devices, including metal cannulas and balloon catheters (Kiykac Altinbas et al., 2015). Despite these advancements, no existing study has comprehensively examined the combined impact of patient education and counseling on both pain and anxiety in women undergoing HSG. Some scholars have emphasized the need for nursing-led research targeting infertile couples undergoing fertility evaluations (Fernández-Sola et al., 2016; Wilson & Leese, 2023). Nurses play a crucial role in identifying and managing pain and anxiety, promoting patient comfort, and providing psychological preparation before and during HSG. Gaining a deeper understanding of women's emotional experiences with HSG enables healthcare providers to deliver more sensitive, individualized, and supportive care (Cunningham & Cunningham, 2023; Fernández-Sola et al., 2016).

1.3. RESEARCH QUESTIONS

1. How does providing pre-procedural education influence women's pain perception during and after undergoing HSG?
2. To what extent does counseling help lower anxiety levels before, during, and following the HSG procedure?

1.4 HYPOTHESES

Null Hypotheses (H₀)

1. Pre-procedural education has no significant effect on pain perception during and after HSG.
2. Counseling does not significantly reduce anxiety levels before, during, and after the HSG procedure.

Alternative Hypotheses (H₁)

1. Pre-procedural education significantly affects pain perception during and after HSG.
2. Counseling significantly reduces anxiety levels before, during, and after the procedure.

1.5 Aim of the Study

The central aim of this study is to assess how effective structured education and counseling are in minimizing pain and anxiety among women undergoing Hysterosalpingography (HSG).

Specific Objectives

1. To examine the influence of pre-procedural education on pain perception during and after HSG.
2. To determine the effectiveness of counseling in reducing anxiety levels before, during, and after the procedure.

1.6 SIGNIFICANCE OF STUDY

By demonstrating how education and counseling can effectively lower pain and anxiety, this study has the potential to improve the overall patient experience during HSG, ultimately making the procedure more tolerable and less intimidating. Although pharmacological interventions such

as analgesics and anesthetics are commonly used to control pain during HSG, this research emphasizes the value of psychological and educational approaches, which are inexpensive, non-invasive, and free from medication-related complications.

Since fear of pain and heightened anxiety often deter women from undergoing HSG—resulting in postponed infertility assessments and delayed treatment—evidence supporting the success of education and counseling could help reassure patients and motivate them to undergo necessary diagnostic evaluations without reluctance. Furthermore, this study will generate empirical data highlighting the advantages of structured pre-procedure education and counseling. Such evidence can serve as a foundation for developing standardized clinical protocols and guidelines for managing women undergoing HSG in radiology and gynecology practice.

1.7 SCOPE OF STUDY

The research was carried out at Lily Hospital, located along Airport Road in Benin City. The study specifically examined how effective structured education and counseling are in minimizing pain and anxiety among women undergoing Hysterosalpingography (HSG).

1.8 Operational Definition of Terms

Education (Pre-procedural Education): A structured delivery of key information regarding the HSG procedure, provided to participants prior to the examination to enhance their understanding and preparedness.

Counselling: A supportive psychological interaction in which patients are encouraged to voice their concerns, receive reassurance, and develop effective emotional coping strategies.

Effectiveness: The quantifiable influence of the educational and counselling interventions on lowering participants' levels of pain and anxiety.

Pain: The intensity of physical discomfort experienced by the participants during the HSG procedure, evaluated using standardized measurement instruments.

Anxiety: The emotional tension, fear, or apprehension associated with the HSG procedure, measured through validated anxiety assessment scales.

Hysterosalpingography (HSG): A diagnostic radiographic technique used to evaluate the uterine cavity and the patency of the fallopian tubes through the injection of a contrast medium followed by X-ray imaging.

CHAPTER TWO

LITERATURE REVIEW

2.1 CONCEPTUAL REVIEW

The literature review provides a comprehensive evaluation of existing scholarship related to the topic, “Effect of Education and Counselling on Reducing Pain and Anxiety in Women Undergoing Hysterosalpingography.” This section integrates theoretical viewpoints and research findings that justify the study, outlines gaps in current knowledge, and underscores the importance of non-pharmacological strategies in managing patient discomfort and anxiety during radiological procedures.

2.1.1. Pharmacological Interventions

Hysterosalpingography (HSG) is commonly performed to evaluate fallopian tube patency as part of infertility investigations. The procedure involves injecting a contrast medium through the cervix and uterus into the fallopian tubes, which allows visualization via X-ray. HSG is often associated with pain, prompting investigation into the need for analgesic interventions (Ahmad et al., 2017).

Systematic analyses of prior studies found no clear evidence that pain relief medications provide benefit during the procedure or within the first 29 minutes afterward. Some studies, however, suggested that analgesics may have a delayed effect, reducing pain when assessed 30 minutes post-procedure. Overall, the evidence supporting pharmacological pain relief during HSG is limited, with only topical analgesics demonstrating a modest reduction in delayed pain. Therefore, topical analgesia could be considered in routine practice to mitigate post-procedural

discomfort, whereas non-steroidal anti-inflammatory drugs (NSAIDs) should currently be reserved for clinical trials (Efe et al., 2018). High-quality, well-powered randomized controlled trials are recommended to evaluate the efficacy of potent NSAIDs and intrauterine analgesia—both separately and in combination—for pain control during and after HSG, including potential adverse effects. Future studies should also consider whether administering intrauterine analgesia 30 minutes before the procedure would be beneficial (Efe et al., 2018).

Pain during HSG arises from multiple sources: cervical instrumentation, uterine distension caused by the contrast medium, and peritoneal irritation from contrast spill into the abdominal cavity. The use of a tenaculum to grasp the cervix and uterine distension can trigger prostaglandin release, leading to uterine cramps and delayed post-procedural pain. Pain from the cervix and lower uterine segment is transmitted via the pelvic splanchnic nerves, whereas pain from the uterine fundus and body is carried through the hypogastric nerves to the lower thoracic spinal segments (Bakas et al., 2021).

Analgesics reduce pain through various mechanisms, including inhibiting prostaglandin synthesis, blocking pain signal transmission in the spinal cord and brain, and interfering with peripheral nerve pain signaling. Despite this, recent large-scale randomized controlled trials (RCTs) have not demonstrated a consistent advantage of pharmacological interventions in alleviating pain during HSG (Ahmad et al., 2017). A 2017 Cochrane review evaluated eight RCTs encompassing 570 women and concluded that there was insufficient evidence to support the use of analgesics over placebo for pain relief during HSG. Four of these trials, involving 270 participants, reported some effectiveness in reducing pain beyond 30 minutes post-procedure, suggesting that further research into NSAIDs and intrauterine anesthesia is warranted (Ahmad et

al., 2017). A 2021 comprehensive review reaffirmed that pharmacological interventions do not significantly reduce pain during HSG (Ahmad et al., 2021).

Alternative strategies, such as topical anesthetics, have shown some efficacy. Liberty et al. (2017) evaluated the use of 25 mg prilocaine-lidocaine (EMLA 5%) cream applied to the cervix prior to HSG and found that it significantly reduced procedural discomfort. Similarly, a randomized controlled trial at Suleyman Demirel University investigated intrauterine lidocaine instillation during saline infusion sonohysterography (SIS) in 156 women. Pain intensity was measured during, immediately after, and 20 minutes post-procedure. No significant differences were found between the study and control groups regarding demographics, obstetric history, prior cervical procedures, chronic pelvic pain, education level, socioeconomic status, menopausal status, saline volume used, tenaculum application, or indications for SIS. However, the study concluded that intrauterine lidocaine effectively reduced discomfort in parous women undergoing SIS (Guvenc et al., 2019)..

2.1.2. Non-Pharmacological Interventions like Music (Lorek et al., 2023)

Music represents a promising yet relatively underexplored non-pharmacological intervention for mechanically ventilated patients in intensive care units (ICUs). During critical care, patients frequently experience disruptions in circadian rhythms, sleep disturbances, and are at elevated risk of delirium—a form of acute brain dysfunction. Intubated patients often face pain, anxiety, physiological stress, fear of death, environmental changes, and restricted mobility due to invasive or non-invasive monitoring. The American Music Therapy Association defines music therapy as the use of individualized music listening as a therapeutic tool by trained healthcare

professionals, which can be administered by nurses or nursing assistants following brief instruction (Lorek et al., 2023).

Music can serve as an inexpensive, non-invasive strategy to reduce anxiety. It may also produce analgesic effects by stimulating the release of endorphins—peptide hormones from the central nervous system that not only alleviate pain but also induce feelings of pleasure and euphoria. Music therapy has been shown to reduce stress, anxiety, pain, nausea, delirium, and depression, fostering harmony between mind, body, and spirit. Numerous studies have demonstrated that integrating music into ICU care is an effective supportive intervention, complementing conventional medical treatment under the supervision of nurses (Bakas et al., 2021). Nurses equipped with clinical competencies in music therapy can enhance patient comfort, address emotional needs, and positively influence clinical outcomes through the stimulation of placebo effects while mitigating nocebo effects.

Music elicits emotional responses that can improve quality of life, though inappropriate use may induce stress or aggression. Its effects on concentration and neuropsychological functioning vary based on individual preference. Some researchers recommend using original or neutral music to avoid triggering negative emotions or distressing memories post-discharge, whereas others advocate for patient-preferred or familiar music during perioperative periods to maximize positive emotional responses (Lorek et al., 2023). Evidence suggests that classical and meditative music is particularly beneficial in ICU settings, as it activates both the left and right hemispheres of the brain, enhancing cognitive processing, learning, and memory retention (Hoffman et al., 2021). Conversely, genres such as heavy metal or techno can be counterproductive, potentially causing stress or life-threatening arrhythmias in critically ill patients. Optimal musical

interventions involve slow-tempo tracks (60–80 beats per minute) aligned with physiological rhythms, combined with a calm environment, reduced lighting, or eye masks (Lorek et al., 2023).

Despite these promising findings, the application of music therapy in intensive care remains incompletely understood. It is crucial to distinguish formal music therapy from general musical interventions, as the mechanisms by which music enhances patient well-being are not fully elucidated. Many studies indicate that music interventions are often applied incorrectly in clinical practice. While properly administered music therapy can promote recovery and improve psychological outcomes, inappropriate implementation may exacerbate anxiety or depression in critically ill patients.

2.1.3. Patient Education and Counseling

Education involves the structured provision of information about the HSG procedure, including its purpose, steps, potential sensations, and anticipated outcomes. By equipping patients with comprehensive knowledge, education seeks to clarify the procedure, establish realistic expectations, and empower patients to actively engage in their healthcare decisions. Evidence indicates that well-informed patients often experience lower anxiety levels and report reduced pain during medical procedures (Guvenc et al., 2019).

Counseling provides psychological support, enabling patients to articulate their fears, concerns, and anxieties regarding HSG. This approach includes active listening, reassurance, and the development of individualized coping strategies to manage stress and discomfort (Jones et al., 2017). Effective counseling minimizes emotional distress and enhances patients' ability to tolerate and cope with the procedure.

The combination of education and counseling has been shown to produce a synergistic effect, significantly reducing both pain and anxiety associated with HSG (Salazar & Isaacson, 2018). To optimize the implementation of these interventions, healthcare providers can adopt several strategies:

1. **Structured educational sessions:** Providing detailed explanations of the HSG procedure using visual aids, brochures, or demonstrations can improve patient understanding and reduce apprehension.
2. **Personalized counseling:** Conducting high-quality sessions tailored to individual patient concerns, addressing specific anxieties, and offering customized coping strategies enhances psychological support.
3. **Peer counseling:** Engaging patients who have previously undergone HSG to share their experiences can provide reassurance, practical advice, and reduce procedural anxiety.
4. **Interdisciplinary collaboration:** Coordinating support among psychologists, nurses, and radiologic technologists ensures a comprehensive care network, further promoting patient comfort and reducing stress during HSG.

2.1.4. Virtual Reality (VR)

Virtual reality (VR), a non-pharmacological intervention, has recently emerged in medical practice as a promising tool for reducing pain and anxiety. By immersing users in a three-dimensional virtual environment, VR distracts attention from physical sensations, typically without causing significant adverse effects (Hoffman et al., 2021). Its effectiveness has been demonstrated across various medical procedures, including reductions in procedural pain during

office hysteroscopy and episiotomy repair (Jahani Shoorab et al., 2015; Mallari et al., 2019; Deo et al., 2021).

Office hysteroscopy and HSG share similar procedural steps, such as the insertion of a speculum and a scope through the cervical canal, with fluid used to distend the uterine cavity (Salazar & Isaacson, 2018). However, HSG may be associated with higher pain levels because the contrast medium passes from the uterus through the fallopian tubes into the abdominal cavity, potentially requiring greater fluid volumes and generating higher intrauterine pressure. Despite these differences, the pain experienced during both procedures is generally classified as mild to moderate (Jones et al., 2017). Consequently, it is plausible that VR could also effectively reduce pain during HSG.

This notion is supported by a recent study demonstrating that VR significantly alleviated pain during HSG. The study, however, had a relatively small sample size of 62 participants and was powered to detect a small effect size (0.88), without administering any analgesics during the procedure (Yılmaz Sezer et al., 2023). Beyond pain reduction, VR has been associated with lower stress (Bekelis et al., 2017; Mosso Vázquez et al., 2017), reduced anxiety (Hoxhallari et al., 2019; Yılmaz Sezer et al., 2023), and higher patient satisfaction during medical interventions (Yılmaz Sezer et al., 2023). Based on these favorable findings, it is hypothesized that VR could serve as an effective intervention for reducing pain in infertile patients undergoing HSG..

2.2 EMPIRICAL REVIEW

Recent empirical studies have explored the effectiveness of education and counseling interventions in mitigating anxiety and pain associated with HSG. Several of these studies are highlighted below.

A cross-sectional study conducted by Adeyekun et al. (2023) in Benin City investigated the relationship between pre-procedural psychological states, demographic factors, and pain perception in 99 women undergoing HSG at the Radiology Department of the University of Benin Teaching Hospital, Nigeria. Using consecutive sampling, data were collected via the Spielberger State-Trait Anxiety Inventory (STAI), Zung Self-Rating Depression Scale, and Visual Analog Scale (VAS) for pain. Results indicated that women with lower state anxiety reported significantly less pain ($\bar{X} = 6.69$) compared to those with higher anxiety ($\bar{X} = 7.93$). Trait anxiety, state anxiety, and depression together predicted pain perception ($R^2 = 0.117$, $F(3,95) = 6.797$; $P < 0.001$), accounting for approximately 17.7% of the variance. The findings suggest that preparing patients for HSG through education on anxiety management and coping strategies, alongside clinical interventions such as anxiolytics, could help reduce pain perception.

In a randomized controlled trial, La Fianza et al. (2024) assessed whether a single session of education and counseling could reduce anxiety and pain in 217 women undergoing HSG for infertility assessment. Participants were randomly assigned to an intervention group ($n = 109$) receiving comprehensive information about the procedure—including purpose, steps, potential sensations, and coping strategies—or a control group ($n = 108$) receiving standard care. Anxiety levels measured via STAI were significantly lower in the intervention group prior to the procedure. However, pain scores assessed with the VAS showed no statistically significant differences between the groups during or after HSG. The study concluded that education and counseling effectively reduced pre-procedural anxiety but did not directly influence pain perception.

Similarly, Guvenc et al. (2019) conducted a randomized controlled trial at Gulhane Training and Research Hospital to evaluate the impact of education and counseling on both anxiety and pain in women undergoing HSG. Participants were randomly assigned to an intervention group, which received detailed education and counseling, or a control group receiving standard care. Anxiety (STAI) and pain (VAS) scores were measured before and during the procedure. Findings demonstrated that the intervention group experienced significantly lower anxiety prior to HSG and reported lower pain levels during the procedure, highlighting the importance of patient preparation in improving procedural outcomes.

Yılmaz Sezer et al. (2023) also examined the effects of education and counseling on anxiety and pain in women undergoing HSG at the Gulhane Training and Research Hospital between May 2016 and January 2017. Volunteer participants were randomly assigned to an intervention group receiving detailed education and counseling or a control group receiving routine information. The intervention group showed significantly reduced anxiety levels prior to the procedure and reported lower pain scores during HSG. The study emphasized the effectiveness of combining education and counseling in alleviating both anxiety and pain, recommending that such interventions be integrated into standard clinical practice.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 RESEARCH SETTING

This study was conducted at Lily Hospital, located on Airport Road in Benin City. As a facility providing radiographic services to a broad patient population, it was deemed an appropriate setting for investigating the objectives of this research.

3.2 STUDY DESIGN

A randomized controlled trial (RCT) design was employed to achieve the objectives of this study. Participants were randomly allocated to either the intervention group, which received structured education and counseling, or the control group, which received standard care without additional intervention.

3.3 TARGET POPULATION

The study targeted women of reproductive age (typically 20–49 years) who were undergoing HSG for infertility evaluation. Additionally, only individuals with no prior experience of HSG were included to assess the impact of education and counseling on first-time participants.

3.4 CONTROL GROUP

The control group consisted of participants undergoing Hysterosalpingography (HSG) who did not receive the education and counseling intervention, instead receiving only the routine standard care prior to the procedure. This group served as a baseline for comparison.

Group	Intervention	Outcome Measured
Intervention Group	Structured education + counselling before HSG	Pain and anxiety levels
Control Group	Routine care (no special education or counselling)	Pain and anxiety levels

3.5 SAMPLING TECHNIQUE

Purposive sampling was employed to ensure adequate representation of women undergoing Hysterosalpingography (HSG). A computer-generated list of random numbers was created in Excel using a simple randomization method with equal allocation (1:1 ratio), where each number corresponded to either the intervention group (“i”) or the control group (“c”). As participants were recruited consecutively from the radiology appointment list, each eligible woman was assigned a number from the pre-generated list (e.g., 1i, 1c, 2i, 2c, etc.). The assigned number was noted on the edge of each participant’s questionnaire, thereby determining their allocation to the intervention or control group without revealing the reason for the different groupings to the participants. This procedure ensured true randomization, eliminating potential bias arising from patient order, characteristics, or researcher influence. Allocation concealment was maintained because the randomization list was prepared prior to recruitment, and participants were assigned sequentially according to the pre-generated numbers.

3.6 SAMPLE SIZE

Using the Cochran formula for sample size estimation,

$$n = \frac{(Z\alpha/2 + Z\beta)^2 \times 2\sigma.^2}{\delta^2}$$

Where;

N= desired sample size

$Z\alpha/2$ = standard normal deviation, usually set at 1.96 (for 95% confidence interval)

$Z\beta$ = 0.84 (for 80% power)

σ = the estimated standard deviation of pain/ anxiety scores

δ = Minimum detectable difference in scores between groups

Based on previous studies (Wang, 2020);

1. Expected reduction in pain score = 2 points (from education & counseling).
2. Estimated standard deviation (σ) = 4

Therefore;

$$n = \frac{(1.96 + 0.84)^2 \times 2(4).^2}{(2)^2}$$

$$n = 63$$

Minimum sample size calculated is 63. In order to account for non-response of participants, 10% of the sample size (i.e., 6.3) was added to the calculated sample size; this gives a sample size of 69.3. However, a maximum number of 69 participants was recruited for this study.

3.7 INSTRUMENT FOR DATA COLLECTION

The primary data collection tools included a structured questionnaire (see Appendix I), the Visual Analog Scale (VAS) for assessing pain intensity, and the State-Trait Anxiety Inventory

(STAI) for measuring anxiety levels before, during, and after the procedure. These instruments were designed to capture both quantitative and qualitative data on the effectiveness of education and counseling in reducing pain and anxiety among women undergoing Hysterosalpingography (HSG).

3.8 VALIDITY OF THE INSTRUMENT

Validity refers to the degree to which an instrument accurately measures the concept it is intended to assess. In this study, content validity was ensured by having the questionnaire reviewed by experts in radiography, gynecology, and psychology, who evaluated it for both face and content validity.

3.9 RELIABILITY OF THE INSTRUMENT

Reliability refers to the consistency of an instrument, indicating that it produces stable and reproducible results over time. Several strategies were employed to ensure the reliability of the questionnaire:

Internal Consistency: The internal consistency of the instrument was evaluated using Cronbach's Alpha, a statistical measure that assesses the degree to which items within each section of the questionnaire are interrelated.

Pilot Study: A pilot study was conducted at Lily Hospital, Airport Road, Benin City, involving approximately 10% of the intended sample size. The pilot aimed to determine the time required to complete the questionnaire, identify potential issues in data collection, and assess the appropriateness of the questionnaire items. This process allowed the researcher to evaluate the clarity and comprehensibility of terms and phrases from the participants' perspective. Feedback

from the pilot study indicated that the questionnaire items were clear, comprehensive, suitable, and easy for participants to complete.

3.10 METHOD OF DATA COLLECTION

This study employed a well-structured questionnaire as the primary data collection instrument, complemented by the Visual Analog Scale (VAS) to assess pain intensity and the State-Trait Anxiety Inventory (STAI) to measure anxiety levels before, during, and after the procedure. The questionnaire was self-administered and distributed to participants at Lily Hospital, Airport Road, Benin City, over a period of 7–8 weeks to ensure adequate response collection.

A randomized controlled trial (RCT) design was utilized as the quantitative experimental approach, whereby participants were randomly assigned to two groups to evaluate the effectiveness of the intervention. Specifically:

- Intervention: Structured education and counseling provided prior to Hysterosalpingography (HSG).
- Outcome: Pain and anxiety levels experienced by participants during and after HSG.

3.11 METHOD OF DATA ANALYSIS

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were employed to summarize participants' socio-demographic characteristics and baseline variables. For the primary outcomes—pain and anxiety scores—-independent samples t-tests were used to compare post-procedure mean scores between the intervention and control groups when the assumptions of normality were met. Within-group pre- and post-intervention comparisons were

conducted using paired t-tests, as appropriate. Effect sizes were calculated using Cohen's d for parametric tests to quantify the magnitude of the intervention's impact. To control for potential confounding variables, such as age or prior HSG experience, analysis of covariance (ANCOVA) was employed, provided that assumptions, including homogeneity of regression slopes, were satisfied. Normality of the data was assessed using the Shapiro-Wilk test, while equality of variances was evaluated using Levene's test. Missing data were examined for randomness using Little's MCAR test. For data missing completely at random (MCAR) and comprising less than 5% of the dataset, pairwise deletion was applied. For missing values exceeding 5% or identified as missing at random (MAR), multiple imputation was performed to minimize bias. Statistical significance was set at $p < 0.05$.

3.12 ETHICAL CONSIDERATIONS

Ethical approval for the study was obtained from the Ethics Committee at Lily Hospital, Airport Road, Benin City. Participants were informed that their involvement was entirely voluntary and that they could withdraw from the study at any time without any negative consequences. Additionally, participants were assured of their anonymity and the confidentiality of their responses through a covering letter.

CHAPTER FOUR

RESULTS

4.1. Socio-Demographic Characteristics of Study Participants

A total of 69 women participated in this study, among these, 25(36.2%) were found to be within the age range of 20-29 years, 24(34.8%) were found to be within 30 -39 years and 20(29.0%) within 40 -49 years. About 44(63.8%) participants attended University and Postgraduate studies, while the remaining 25 (36.2%) attended either only primary or secondary school. The majority of participants 53(76.8%) were married. All participants 69(100%) had undergone the procedure, HSG, among these some were educated and counselled before undergoing the procedure.

Table 4.1 Socio-Demographic Characteristics of Study Participants

Characteristics	Category	Frequency
Age	20 – 29	25(36.2%)
	30 - 39	24(34.8%)
	40 - 49	20(29.0%)
Education	Primary School	10(14.5%)
	Secondary School	15(21.7%)
	University/College	20(29.0%)
	Postgraduate	24(34.8%)
Marital Status	Single	7(10.1%)
	Married	53(76.8%)

	Divorced	5(7.2%)
	Widowed	4(5.8%)
Have you ever undergone an HSG procedure before?	Yes	47(68.1%)
	No	22(31.9%)

4.2. Pre-Procedural Education And Counselling

The proportion of participants that received clear and adequate information (Intervention group) about the HSG procedure were 35(50.7%) and those that didn't (control group) were 34(49.3%). Among these intervention group, 32(91.4%) attested that the education and counselling helped them very much while the other 3(8.6%) saw the education and counselling has been moderately helpful.

Table 4.2. Pre-procedural education and Counseling of Study Participants

Questions	Responses	Intervention Group	Control Group
Did you receive clear and adequate information about the HSG procedure before it was performed?	Yes, I received	35(50.7%)	0(0%)
	No	0(0%)	34(49.3%)
Did the pre-procedural education and counselling help reduce your fear and anxiety of the HSG procedure?	Slightly	0(0%)	0(0%)
	Moderately	3(8.6%)	0(0%)
	Very Much	32(91.4%)	0(0%)

4.3. Pain And Anxiety Levels During HSG Procedure

Table 4.3.1 shows study participants which were grouped under a control group, 58.8% experience moderate pains while 41.2% had severe pains while among those under the intervention group, 82.9% had only mild pains and 17.1% had moderate pains. The study participants showed in Table 4.3.2 were also grouped under a control and intervention group.

Among the control group, a higher proportion 67.7% had high anxiety while for the intervention group, a larger proportion 88.6% were rarely anxious.

Table 4.3.1. VAS Pain Scores of Study Participants

VAS Pain Scores	Control Group	Intervention Group
0-3	0(0%)	29(82.9%)
4-6	20(58.8%)	6(17.1%)
7-10	14(41.2%)	0(0%)
Mean VAS Pain Scores	7.09 ± 0.87	2.34 ± 0.76

*0-3; Mild pain, 4-6; Moderate Pain, 7-10; Severe Pain.

Table 4.3.2. STAI Anxiety Scores of Study Participants

STAI Anxiety Scores	Control Group	Intervention Group
6-11	2(5.9%)	31(88.6%)
12-17	9(26.5%)	4(11.4%)
18-24	23(67.7%)	0(0%)
Mean STAI Anxiety Scores	18.20 ± 3.24	7.6 ± 1.79

* 6-11; Low Anxiety, 12-17; Moderate Anxiety, 18-24; High Anxiety.

4.6 Test of Hypothesis

The researcher employed T-test statistics to test the hypothesis at a significance level of 0.05. The choice rule was based on the p-value linked with the T-test. Thus, if the p-value is less than 0.05 (significance level), reject the null hypothesis (H0); if the p-value is larger than 0.05, accept H0.

The following hypothesis was confirmed and tested using T-test statistics:

H1; There is a significant impact of pre-procedural education and counseling on reducing anxiety levels before, during and after the procedure.

Categories	Control Group	Intervention Group	P-value
Mean VAS Pain Scores	7.09 ± 0.87	2.34 ± 0.76	<0.05
Mean STAI Anxiety Scores	18.20 ± 3.24	7.6 ± 1.79	<0.05

***0.05 – Statistically Significant**

4.5 Discussion of Findings

Regarding pre-procedural education and counseling, 35 participants (50.7%) in the intervention group received clear and adequate information about the HSG procedure, while 34 participants (49.3%) in the control group did not. Among the intervention group, 32 participants (91.4%) reported that the education and counseling were very helpful, while 3 participants (8.6%) found them moderately helpful. These findings are consistent with La Fianza et al. (2024), whose study demonstrated that a single education and counseling session significantly reduced pre-procedural anxiety in women undergoing HSG for infertility assessment.

During the HSG procedure, 58.8% of participants in the control group experienced moderate pain, and 41.2% reported severe pain. In contrast, 82.9% of participants in the intervention group reported only mild pain, while 17.1% experienced moderate pain. Similarly, anxiety levels were markedly different between the groups: 67.7% of the control group exhibited high anxiety, whereas 88.6% of the intervention group were rarely anxious.

These results align with the study by Guvenc et al. (2020), which examined the effects of education and counseling on both anxiety and pain in women undergoing HSG at the Gulhane Training and Research Hospital. Participants were randomly assigned to either an intervention group, which received detailed education and counseling, or a control group, which received standard care. Anxiety was measured using the STAI, and pain was assessed using the VAS. The intervention group demonstrated significantly lower anxiety before the procedure and reported lower pain levels during HSG compared to the control group. The study concluded that structured education and counseling effectively reduced both anxiety and pain, highlighting the importance of patient preparation in improving procedural outcomes.

Hypothesis testing revealed that all comparisons between the control and intervention groups yielded p -values < 0.05 , indicating statistical significance. Consequently, the null hypotheses were rejected, and the alternate hypotheses were accepted.

CHAPTER FIVE

CONCLUSION, RECOMMENDATIONS AND LIMITATIONS OF STUDY

5.1 Conclusion

This study demonstrated that pre-procedural education and counseling significantly reduce pain and anxiety among women undergoing hysterosalpingography (HSG). Participants who received structured information about the procedure, expected sensations, coping strategies, and post-procedural care reported lower anxiety and pain scores compared to those who received standard care. These findings underscore the critical role of psychological preparation as an integral component of patient-centered care in diagnostic radiology. Integrating education and counseling into routine pre-HSG protocols can enhance patient comfort, cooperation, and overall procedural experience.

5.2 Recommendations

- Integrate Pre-Procedural Education and Counseling: Radiology departments should establish a standard operating procedure (SOP) mandating a 15–20 minute education and counseling session for all HSG patients, delivered by trained staff, with completion documented in the patient's file.
- Regular Staff Training: Conduct quarterly or biannual training for radiographers and nurses on patient-centered counseling, anxiety management, and communication skills, including practical demonstrations and role-playing exercises.
- Develop Multimodal Educational Materials: Provide easy-to-understand materials such as short videos, illustrated pamphlets, posters, and infographics explaining the HSG procedure. Ensure distribution during appointment booking and in waiting areas.

- **Implement Individualized Counseling:** Use brief pre-procedure anxiety checklists to identify high-anxiety patients and tailor counseling to their literacy level, emotional state, and prior experiences, allocating extra time as needed.
- **Follow-up and Monitoring:** Collect post-procedure feedback on pain, anxiety, clarity of information, and overall satisfaction. Regularly review these data to refine counseling protocols.
- **Expand Research:** Conduct larger, multi-center trials to validate findings, explore additional outcomes (e.g., procedure duration, patient cooperation, repeat HSG rates), and test the applicability of counseling for related procedures such as hysterosonography, mammography, and MRI.

5.3 Limitations of the Study

- **Limited Sample Size:** The relatively small number of participants may limit statistical power and generalizability.
- **Single-Center Design:** Conducting the study in one facility restricts diversity in patient demographics and clinical practices, limiting external validity.
- **Self-Reported Measures:** Pain and anxiety were assessed through self-report scales, which may be influenced by subjective interpretation, recall bias, or cultural factors.
- **Short-Term Outcome Assessment:** Only immediate effects on pain and anxiety were measured, leaving long-term impacts unexamined.
- **Uncontrolled Confounding Variables:** Factors such as prior painful experiences, baseline anxiety, pain thresholds, and social support were not fully controlled, which may influence the results.

5.4 Suggestion for Further Studies

- Multi-Center Trials: Include multiple hospitals with diverse patient populations to enhance external validity.
- Larger Sample Sizes with Stratified Sampling: Increase statistical power and enable subgroup analyses to identify which groups benefit most from counseling.
- Objective Measures of Anxiety: Combine self-reports with physiological indicators (e.g., heart rate, blood pressure, galvanic skin response) to improve measurement accuracy.
- Long-Term Follow-Up: Assess effects at 1 week, 1 month, and 3 months post-procedure to determine sustained benefits and patient satisfaction.
- Control Psychological and Experiential Variables: Adjust for prior traumatic experiences, baseline anxiety, pain thresholds, and social support to isolate intervention effects.
- Compare Counseling Modalities: Evaluate in-person vs. telehealth vs. video-based counseling, education-only vs. CBT-based counseling vs. relaxation training, and brief vs. intensive sessions to identify the most efficient approach.
- Qualitative or Mixed-Methods Studies: Explore patient perspectives, cultural concerns, and emotional barriers to enhance patient-centered intervention design.
- Combined Non-Pharmacological Interventions: Assess the effectiveness of counseling when combined with strategies such as breathing exercises, music therapy, or guided imagery.

REFERENCES

- Adeyekun, A. A., Koleoso, O. N., & Akanni, O. O. (2023). Preinvestigation psychological state and related demographic factors as predictors of pain perception in women undergoing hysterosalpingography. *Philippine Journal of Obstetrics and Gynecology*, 47(4), 206–213. https://doi.org/10.4103/pjog.pjog_50_23
- Agwu, K. K., & Okoye, I. J. (2017). The effect of music on the anxiety levels of patients undergoing hysterosalpingography. *Radiography*, 13(2), 122-125. <https://doi.org/10.1016/j.radi.2005.12.002>.
- Ahmad, G., Attarbashi, S., O'Flynn, H., & Watson, A. J. (2021). Pain relief in office gynaecology: A systematic review and meta-analysis. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 155(1), 3–13 <https://doi.org/10.1016/j.ejogrb.2019.12.009>
- Ahmad, G., Duffy, J. M., O'Flynn, H., & Watson, A. (2017). Pain relief in hysterosalpingography. *Cochrane Database of Systematic Reviews*. <https://doi.org/10.1002/14651858.cd006106.pub2>
- Asilioglu, K., & Celik, S. S. (2021). The effect of preoperative education on postoperative pain and anxiety. *Journal of PeriAnesthesia Nursing*, 36(1), 44–49.
- Bakas, P., Tzouma, C., Bouchlariotou, S., & Tsampalas, M. (2021). Pain management during hysterosalpingography: A systematic review. *Pain Research and Management*, 2021, 1–7. <https://doi.org/10.1155/2021/6615158>
- Balci, O., Acar, A., Mahmoud, A. S., & Colakoglu, M. C. (2021). Effect of pre- amniocentesis counseling on maternal pain and anxiety. *Journal of Obstetrics and Gynaecology Research*, 37(12), 1828-1832. <https://doi.org/10.1111/j.1447- 0756.2021.01621.x>.
- Bekelis, K., Calnan, D., Simmons, N., MacKenzie, T. A., & Kakoulides, G. (2017). Effect of an immersive preoperative virtual reality experience on patient-reported outcomes: A randomized controlled trial. *Annals of Surgery*, 265, 1068–1073.
- Bot Robin, V., Sendon, S., Bourzoufi, K., Vaast, P., Deken, V., Dutoit, P., & Houfflin- Debarge, V. (2020). Maternal anxiety and pain during prenatal diagnostic techniques: a prospective study. *Prenatal diagnosis*, 32(6), 562-568. <https://doi.org/10.1002/pd.3857>
- Cicinelli, E. (2019). Hysteroscopy without anesthesia: review of recent literature. *Journal of minimally invasive gynecology*, 17(6), 703-708.
- Cunningham, N., & Cunningham, T. (2023). Women's experiences of infertility– towards a relational model of care. *Journal of clinical nursing*, 22(23-24), 3428-3437. <https://doi.org/10.1111/jocn.12338>

- Deo, N., Khan, K. S., Mak, J., Allotey, J., Gonzalez Carreras, F. J., Fusari, G., & Benn, J. (2021). Virtual reality for acute pain in outpatient hysteroscopy: A randomized controlled trial. *BJOG*, 128, 87–95.
- Dreyer, K., van Eekelen, R., Tjon-Kon-Fat, R. I., van der Steeg, J. W., Steures, P., Eijkemans, M. J. C., ... & van Geloven, N. (2019). The therapeutic effect of hysterosalpingography in couples with unexplained subfertility: a post-hoc analysis of a prospective multi-centre cohort study. *Reproductive biomedicine online*, 38(2), 233-239. <https://doi.org/10.1016/j.rbmo.2018.11.005>
- Efe, E., Gozuyesil, E., & Hanoglu, Z. (2018). The effects of relaxation exercises on anxiety and pain in patients undergoing gynecologic surgery. *Holistic Nursing Practice*, 32(1), 29–35.
- Erkilinç, S., Kala, N. A., Pekcan, M. K., Güzel, A. İ., Çımar, M., & Yılmaz, N. (2018). The effect of a pre-procedure information video on anxiety levels in patients undergoing hysterosalpingography: A prospective case-control study. *Journal of the Turkish German Gynecological Association*, 19(3), 137. <https://doi.org/10.4274/jtggga.2017.0118>.
- Fernández Sola, C., Martínez Caba, M. I., Hernández Padilla, J. M., Carmona Samper, E., & Granero Molina, J. (2016). Experiences of Spanish women undergoing hysterosalpingography as part of the infertility process: a phenomenological study. *Journal of clinical nursing*, 25(3-4), 494-504. <https://doi.org/10.1111/jocn.13077>.
- Guvenc, G., Bektas Pardes, B., Kinci, M. F., & Karasahin, K. E. (2019). Effect of education and counselling on reducing pain and anxiety in women undergoing hysterosalpingography: A randomised controlled trial. *Journal of Clinical Nursing*, 29(9–10), 1653–1661. <https://doi.org/10.1111/jocn.15166>
- Hacivelioglu, S., Gencer, M., Cakir Gungor, A., Kosar, S., Koc, E., & Cosar, E. (2024). Can the addition of a paracervical block to systemic or local analgesics improve the pain perceived by the patient during hysterosalpingography?. *Journal of Obstetrics and Gynaecology*, 34(1), 48-53. <https://doi.org/10.3109/01443615.2023.828025>.
- Handelzalts, J. E., Levy, S., Peled, Y., Binyamin, L., Wiznitzer, A., Goldzweig, G., & Krissi, H. (2016). Information seeking and perceptions of anxiety and pain among women undergoing hysterosalpingography. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 202, 41-44. <https://doi.org/10.1016/j.ejogrb.2016.04.037>.
- Hanprasertpong, T., Rattanaprueksachart, R., Janwadee, S., Geater, A., Kor anantakul, O., Suwanrath, C., & Hanprasertpong, J. (2023). Comparison of the effectiveness of different counseling methods before second trimester genetic amniocentesis in Thailand. *Prenatal diagnosis*, 33(12), 1189-1193. <https://doi.org/10.1002/pd.4222>.
- Hindocha, A., Beere, L., O'Flynn, H., Watson, A., & Ahmad, G. (2015). Pain relief in hysterosalpingography. *Cochrane Database of Systematic Reviews*, (9). <https://doi.org/10.1002/14651858.CD006106.pub3>.

- Hoffman, H. G., Chambers, G. T., Meyer, W. J. III, Arceneaux, L. L., Russell, W. J., Seibel, E. J., Richards, T. L., Sharar, S. R., & Patterson, D. R. (2021). Virtual reality as an adjunctive non-pharmacologic analgesic for acute burn pain during medical procedures. *Annals of Behavioral Medicine*, 41(2), 183–191. <https://doi.org/10.1007/s12160-010-9248-7>
- Hoxhallari, E., Behr, I. J., Bradshaw, J. S., Morkos, M. S., Haan, P. S., Schaefer, M. C., & Clarkson, J. H. W. (2019). Virtual reality improves the patient experience during wide-awake local anesthesia no tourniquet hand surgery: A single-blind, randomized, prospective study. *Plastic and Reconstructive Surgery*, 144, 408–414.
- Jahani Shoorab, N., Ebrahimzadeh Zagami, S., Nahvi, A., Mazluom, S. R., Golmakani, N., Talebi, M., & Pabarja, F. (2015). The effect of virtual reality on pain in primiparity women during episiotomy repair: A randomized clinical trial. *Iranian Journal of Medical Sciences*, 40(3), 219–224.
- Jones, K. R., Vojir, C. P., Hutt, E., & Fink, R. (2017). Determining mild, moderate, and severe pain equivalency across pain-intensity tools in nursing home residents. *Journal of Rehabilitation Research & Development*, 44, 305–314.
- Karrasahin, E., Alanbay, I., Keskin, U., Gezginc, K., & Baser, I. (2019). Lidocaine 10% spray reduces pain during hysterosalpingography: a randomized controlled trial. *Journal of Obstetrics and Gynaecology Research*, 35(2), 354-358. <https://doi.org/10.1111/j.1447-0756.2008.00938.x>
- Kiykac Altinbas, S., Dilbaz, B., Zengin, T., Kilic, S., Cakir, L., Sengul, O., & Dede, S. (2015). Evaluation of pain during hysterosalpingography with the use of balloon catheter vs metal cannula. *Journal of Obstetrics and Gynaecology*, 35(2), 193-198. <https://doi.org/10.3109/01443615.2024.948400>.
- Kiykac Altinbas, S., Yavuz, C., Cevik, O., & Arslan, D. (2020). Predictors of pain during hysterosalpingography: A prospective observational study. *The Eurasian Journal of Medicine*, 52(3), 232–236.
- La Fianza, A., Dellafiore, C., Travaini, D., Broglia, D., Gambini, F., Scudeller, L., ... & Brondino, N. (2024). Effectiveness of a single education and counseling intervention in reducing anxiety in women undergoing hysterosalpingography: a randomized controlled trial. *The Scientific World Journal*, 2024. <http://dx.doi.org/10.1155/2024/598293>.
- Liberty, G., Gal, M., Halevy-Shalem, T., et al. (2017). Lidocaine-prilocaine (EMLA) cream as analgesia for hysterosalpingography: A prospective, randomized, controlled, double-blinded study. *Human Reproduction*, 22(5), 1335–1339. <https://doi.org/10.1093/humrep/del502>
- Lindequist, S., Justesen, P., Larsen, C., & Rasmussen, F. (2015). Diagnostic quality and complications of hysterosalpingography: oil-versus water-soluble contrast media--a randomized prospective study. *Radiology*, 179(1), 69-74. <https://doi.org/10.1148/radiology.179.1.1848715>.

- Lorek, M., Bąk, D., Kwiecień-Jaguś, K., & Mędrzycka-Dąbrowska, W. (2023). The effect of Music as a Non-Pharmacological Intervention on the physiological, psychological, and social response of patients in an intensive care unit. *Healthcare, 11*(12), 1687. <https://doi.org/10.3390/healthcare11121687>
- Mallari, B., Spaeth, E. K., Goh, H., & Boyd, B. S. (2019). Virtual reality as an analgesic for acute and chronic pain in adults: A systematic review and meta-analysis. *Journal of Pain Research, 12*, 2053–2085.
- Mosso Vázquez, J. L., Wiederhold, B. K., Miller, I., & Wiederhold, M. D. (2017). Virtual reality-assisted anesthesia during upper gastrointestinal endoscopy: Report of 115 cases. *EMJ Innovations, 1*, 75–82.
- Park, A., Quaas, A.M., Hansen, K.R., Porter, B., Burks, H. & LaTasha, B. C. (2024). Predictors of Pain Associated With Hysterosalpingography (HSG): A Prospective Cohort Study. *Austin J Womens Health, 1*(2), 4.
- Safi, F., Rabiee, L., Shokrpour, M., & Kamali, A. (2019). Comparison of midazolam and dexmedetomidine for pain relief during and after hysterosalpingography in women with infertility. *Journal of Medicine and Life, 12*(2), 173. <https://doi.org/10.25122/jml-2019-0013>.
- Salazar, C. A., & Isaacson, K. B. (2018). Office operative hysteroscopy: An update. *Journal of Minimally Invasive Gynecology, 25*, 199–208.
- Su, T. J., Tzeng, Y. L., & Kuo, P. C. (2019). The anxiety of Taiwanese women with or without continuity treatment after previous in vitro fertilisation failure. *Journal of clinical nursing, 20*(15- 16), 2217-2223. <https://doi.org/10.1111/j.1365-2702.2021.03730.x>
- Szymusik, I., Grzechocińska, B., Marianowski, P., Kaczyński, B., & Wielgoś, M. (2015). Factors influencing the severity of pain during hysterosalpingography. *International Journal of Gynecology & Obstetrics, 129*(2), 118-122. <https://doi.org/10.1016/j.ijgo.2024.11.015>.
- Tiboni, G. M., Giampietro, F., & Gallo, L. (2014). Hysterosalpingography: pain and side effects. *Fertility and Sterility, 102*(2), e113.
- Ting, R. Y. T., Cheng, S. W. S., & Ng, E. H. Y. (2021). Psychological impact of infertility and patients' expectations for counselling. *Human Reproduction Open, 2021*(4), hoab029.
- Tokmak, A., Kokanali, M. K., Güzel, A. İ., Taşdemir, Ü., Akselim, B., & Yilmaz, N. (2015). The effect of preprocedure anxiety levels on postprocedure pain scores in women undergoing hysterosalpingography. *Journal of the Chinese Medical Association, 78*(8), 481- 485. <https://doi.org/10.1016/j.jcma.2015.01.010>
- Unlu, B. S., Yilmazer, M., Koken, G., Arioz, D. T., Unlu, E., Baki, E. D., Karacin, O. (2015). Comparison of four different pain relief methods during hysterosalpingography: a randomized controlled study. *Pain Research and Management, 20*(2), 107-111. <http://dx.doi.org/10.1155/2015/306248>.

Wang, X., Liu, Y., Tan, S., & Zhang, T. (2020). Sample size estimation in clinical research. *CHEST*, 158(1), S12–S20. <https://doi.org/10.1016/j.chest.2020.03.015>

Wilson, C., & Leese, B. (2023). Do nurses and midwives have a role in promoting the well-being of patients during their fertility journey? A review of the literature. *Human Fertility*, 16(1), 2-7. <https://doi.org/10.3109/14647273.2023.781687>.

Yılmaz Sezer, N., Aker, M. N., Gönenç, İ. M., Topuz, Ş., & Şükür, Y. E. (2023). The effect of virtual reality on women's perceived pain, fear, anxiety, and views about the procedure during hysterosalpingography: A randomized controlled trial. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 286, 5–9.

APPENDIX I

QUESTIONNAIRE

RESEARCH TITLE: EFFECT OF EDUCATION AND COUNSELLING ON REDUCING PAIN AND ANXIETY IN WOMEN UNDERGOING HYSTEROSALPINGOGRAPHY: A RANDOMISED CONTROLLED TRIAL. I am a researcher in the Department of Radiography, School of Basic Medical Science, University of Benin, Benin City; I am carrying out research on the above topic in partial fulfillment for the award of Bachelor of Radiography degree.

Could you please spare some of your time to fill this questionnaire?

Your cooperation and support are deeply appreciated.

GENERAL INSTRUCTION FOR PARTICIPANTS:

- Do not write personal details not asked (for example phone number) and be truthful as much as possible
- Tick [✓] where appropriate
- Please answer all questions

SECTION 1: Demographic Information

(Tick (✓) the appropriate response or fill in where necessary.)

1. **Age Group:** 20–29 years: []; 30–39 years []; 40–49 years [].
2. **Sex:** Female [].
3. **Marital Status:** Single []; Married []; Divorced []; Widowed [].
4. **Have you ever undergone an HSG procedure before?** Yes []; No [].

SECTION B: PRE-PROCEDURAL EDUCATION

(Please rate your agreement with the following statements about the education you received before your HSG.)

Scale: 1 – Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 – Strongly Agree

S/ N	Statement	1	2	3	4	5
1	I received clear and adequate information about the HSG procedure before it was performed.	[]	[]	[]	[]	[]
2	The pre-procedural education helped reduce my fear of the HSG procedure.	[]	[]	[]	[]	[]
3	I understood what to expect during and after the HSG procedure.	[]	[]	[]	[]	[]
4	The information provided helped me prepare mentally for the HSG.	[]	[]	[]	[]	[]
5	I felt more confident about undergoing the procedure after receiving the education.	[]	[]	[]	[]	[]

SECTION C: COUNSELLING AND ANXIETY REDUCTION

(Use the same scale as above.)

S/N	Statement	1	2	3	4	5
1	<p>I received psychological or emotional support (counseling) before the procedure.</p>	[]	[].	[].	[].	[].
2	<p>The counseling helped reduce my anxiety before the procedure.</p>	[].	[].	[].	[].	[].
3	<p>I felt emotionally supported and less stressed during the</p>	[].	[]	[].	[].	[].

S/N	Statement	1	2	3	4	5
	procedure.					
4	Counseling helped me cope better with discomfort during the procedure.	[].	[].	[].	[].	[].
5	The counseling reduced my anxiety after the procedure.	[].	[].	[].	[].	[].

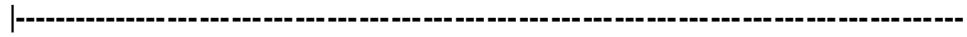
SECTION D: ASSESSMENT TOOLS FOR PAIN AND ANXIETY MEASUREMENT

VISUAL ANALOGUE SCALE (VAS) FOR PAIN

Instruction: Please mark a point on the line below that best describes the amount of pain you felt during the Hysterosalpingography (HSG) procedure.

No Pain

Worst Possible Pain



0

2

4

6

8

10

Scoring:

- Measure the distance in centimeters from the “No Pain” end to the patient’s mark.
- Convert this to a 0–10 numeric score.

Interpretation:

0–3 = Mild Pain

4–6 = Moderate Pain

7–10 = Severe Pain

STATE-TRAIT ANXIETY INVENTORY (STAI)

Instruction: Below are statements that describe how people feel. Read each statement carefully and mark the number that best describes how you feel RIGHTNOW.

Please use the scale below:

1 = Not at all 2 = Somewhat 3 = Moderately so 4 = Very much so

No.	Statement	1	2	3	4
1	I feel calm				

2	I am tense				
3	I feel upset				
4	I am relaxed				
5	I feel content				
6	I am worried				

Scoring Instructions:

- Reverse-score items 1, 4, and 5 (i.e., 1 = 4, 2 = 3, 3 = 2, 4 = 1).
- Add all six scores for a total score between 6 and 24.

Interpretation:

6–11 = Low anxiety

12–17 = Moderate anxiety

18–24 = High anxiety

SECTION E: GENERAL FEEDBACK

1. What was the most helpful part of the education or counseling you received?

2. Do you have any suggestions for improving the HSG experience for other women undergoing this procedure?

Thank you for your participation in this questionnaire. Your input is essential to the success of this research project. Your responses will be kept confidential, and your involvement is greatly appreciated.

APPENDIX II

EDUCATION TO BE GIVEN BEFORE HYSTEOSALPINGOGRAPHY

The educational component of my intervention aims to reduce fear, clarify misconceptions, increase awareness, and psychologically prepare women for the HSG procedure. It involves providing structured, clear, culturally appropriate, and evidence-based information about HSG using both verbal and written/visual formats.

A. Objectives of the Education

The educational session should help patients:

1. Understand the purpose and importance of HSG.
2. Know what to expect before, during, and after the procedure.
3. Reduce fear of the unknown and build trust in the procedure.
4. Be aware of normal sensations (e.g., mild pain, cramping) versus warning signs.
5. Learn strategies to remain calm and reduce anxiety during the procedure.

B. Content of the Education

Below is a breakdown of what should be included:

1. Overview of HSG

- What is Hysterosalpingography?
- Why it is done (e.g., to investigate infertility, check fallopian tubes, uterine shape).

- Role of contrast media and fluoroscopy (X-ray).

2. Step-by-Step Description of the Procedure

- How the patient will be positioned on the examination table.
- Use of a speculum and insertion of a catheter into the cervix.
- Injection of contrast dye into the uterus and tubes.
- Real-time imaging using fluoroscopy.
- Duration of the procedure (typically 10–15 minutes).

3. Sensations and Discomforts

- Mild to moderate cramping similar to menstrual pain may occur.
- Pressure sensation as dye is injected.
- Rare but possible spotting afterward.

4. Preparation Instructions

- When to schedule the procedure (usually between Day 7 and 10 of the menstrual cycle).
- Pre-medication (e.g., mild analgesics if prescribed).
- Emptying the bladder before the exam.
- Avoidance of sexual activity the day before the procedure.

5. Post-Procedure Care

- Mild cramping and discharge are common.
- When to seek medical attention (e.g., severe pain, heavy bleeding, fever).
- Ability to resume daily activities soon after.

6. Benefits and Risks

- Diagnostic value in infertility evaluation.
- Non-surgical and quick.
- Minimal risk of infection or allergic reaction to contrast (rare).

7. Emotional Reassurance

- Emphasis that anxiety is common but manageable.
- Reassuring the patient of staff support throughout the process.
- Encouragement of questions and emotional expression.

C. Mode of Delivery

1. Verbal Session

- 10–15 minutes of one-on-one or small group teaching by the researcher.
- Use of simple language in the local dialect or preferred language.
- Patient-centered approach, encouraging questions and interaction.





2. Visual Aids (Optional but Recommended)

- Short video demonstration of the procedure.
- Flip charts or posters in the waiting area.

D. Timing of the Education

- Delivered before the procedure, ideally 30–60 minutes prior to HSG or the day before.
- Ensures the patient has time to process the information and ask questions.

APPENDIX III
ETHICAL APPROVAL



LILY HOSPITALS

Our Ref: LH/HREC-LFB/0070-25
Registration NO: NHREC/LIHREC/09/09/24

2025 August 21


Laoye Funmilayo Benedicta
Department of Radiography
School of Basic Medical Sciences
University of Benin City
Edo state


RE: APPLICATION FOR ETHICAL CLEARANCE


I am directed to refer to your application dated 11/06/2025 on the above subject matter.


I am to inform you that your research **“Effect of Education and Counselling on Reducing Pain and Anxiety in Women Undergoing Hysterosalpingography: A Randomised Controlled Trial.”** has been considered and approved by the Health Research Ethics Committee.


In light of the above, you are hereby permitted by the Health Research Ethics Committee to carry out your research since it is ethically acceptable.


Kind regards

Dr. Mayomi Onuwaje
Chairman Lily Hospital Limited HREC




 **WARRI:**
6, Brisebe Lane, Off Eluwere Road, Warri, Delta State.

 **BENIN CITY:**
16A Ede-Osagie Street GRA, Benin City, Nigeria.

 **LILY COMMUNITY HOSPITAL:**
9 Freshville Street, Ughelli Road, Okoko

 **LILY WELLNESS CENTRE:**
18 Deco Road, Warri.

 **LILY HOSPITAL EDEBEA:**
1 Sakoto Close, Farmer Shell Estate, Edebea

APPENDIX IV

INFORMED CONSENT FORM

Dear Sir/Ma,

Permission to Include Your Facility/Site in a Research

Title of Research: EFFECT OF EDUCATION AND COUNSELLING ON
REDUCING PAIN AND ANXIETY IN WOMEN
UNDERGOING HYSTEROSALPINGOGRAPHY: A
RANDOMISED CONTROLLED TRIAL.

Principal Investigator: (1) - DR. AKPOBASAHAHAN E. A

Co-Investigator: (2) - LAOYE FUNMILAYO BENEDICTA

Institution and Contact Address: Department of Radiography,
School of Basic Medical Sciences,
College of medical Sciences,
University of Benin,
P. M. B 1154
Benin City, Edo State.

Phone Number:

Email address:

Commencement Date of Research: September, 2025.

Proposed duration of Research: Two (2) Months

Financial Sponsors: Self-Sponsored Research.

Conflict of Interest: We declare that there is no conflict of interest

The Purpose of Research: The specific objective is to evaluate the effectiveness and outcome of education and counseling in reducing pain and anxiety in women who are undergoing Hysterosalpingography (HSG).

Sample Size: Sixty-Nine (69).

Procedure Involved in the Study: Administration of structured questionnaire.

Research Design and method: The study is a Randomized Controlled Trial.

Benefits to Participants: No special benefits to the participants, however, they will be education on the overview of hysterosalpingography (HSG).

Risk to Participant: There is no risk to participants

Compensation/Inducement: Participants will receive no financial compensation and will not be forced to participate.

Statement of Voluntaries and Circumstances for withdrawal: Participants are allowed to withdraw from the research at any stage and the withdrawal will have no adverse effect on them in any form.

Confidentiality of Participant: Information obtained would be treated with confidentiality while identities of the participants would be protected during the presentation of the findings either at conferences, seminars or lectures.

