Effect of Pre-procedure Anxiety Levels on Post-procedure Pain Scores in Women Undergoing Hysterosalpingography in South-south Nigeria

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ABSTRACT

Background: Infertility is the inability of a couple to conceive after one year of regular, unprotected sexual intercourse. Hysterosalpingography plays a very crucial role the evaluation of the women with infertility.
Objective: To determine the relationship between pre-procedure anxiety and procedure-associated pain among infertile women undergoing hysterosalpingography.
Materials and Methods: This prospective survey was conducted at the Obstetrics and Gynaecology, and Radiology Departments of the two tertiary health institutions in Bayelsa State, Nigeria, from January to August, 2021. Hysterosalpingography was done for 380 infertile women, after obtaining written informed consent. Beck's Anxiety Inventory (BAI) and Numerical Rating Scale

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(NRS) were used to grade levels of anxiety and pain, respectively. Data were entered into a pre-designed proforma, and analysed using Statistical Product and Service Solutions (SPSS) version 25.0. Results were presented in frequencies and percentages for categorical variables; mean and standard deviation for continuous variables.

Results: The pre-procedure anxiety scores showed significant, positive, and strong relationship with post-procedure pain scores, reflected in a correlation coefficient of 0.50 (p – 0.001). For every unit change in anxiety score, there was an estimated 25.4% change in the pain perception documented by the participants. For participants who had an anxiety score of 0, there was an average pain score of 3.45.

Conclusion: This study established a positive correlation between pre-hysterosalpingography anxiety scores and post-hysterosalpingography pain scores.

1. INTRODUCTION

Hysterosalpingography is a crucial investigative modality in gynaecological practice used for the evaluation of infertile women. Infertility causes anxiety and stress for the couple involved. Hysterosalpingography is cheap, readily available and reliable. It is recommended by the National Institute for Health and Care Excellence (NICE) for evaluation of tubal patency [1]. It is the most commonly used investigative modality for the evaluation of tubal patency. However, its main drawback is associated pain. Nyengidiki and colleague reported that 93.1% of women had pain following hysterosalpingography [2]. Anxiety has been reported to be significantly higher among women referred for hysterosalpingography when compared to those referred for colposcopy, mammography or abdominal ultrasound scan [3,4].

Infertility is the inability of a couple to conceive after one year of regular, unprotected sexual intercourse. The World Health Organisation, in 2018, described infertility as a disease of the male or female reproductive system defined by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse [5]. Infertility causes a lot of anxiety and stress for the couple involved. Up to 25% of Nigerian women will be investigated for infertility during their reproductive life.[6] Some factors have been associated with pain following hysterosalpingography. They are psychological and social factors [7], emotional state, nulliparity, type of infertility, dysmenorrhoea, chronic pelvic pain, presence of cystocele, tubal obstruction, duration of the procedure, amount of contrast used, anxiety, depression, and a woman's anticipation of hysterosalpingography-associated pain [4,8–10].

There is paucity of published data on the relationship between pre-procedure anxiety and hysterosalpingography-associated pain. Therefore, the objective of this study was to determine the relationship between pre-procedure anxiety and procedure-associated pain among infertile women undergoing hysterosalpingography in the two tertiary health institutions in Bayelsa State, South-South Nigeria.

2. MATERIALS AND METHODS

This study was conducted at the Departments of Obstetrics and Gynaecology, and Radiology of the Federal Medical Centre, Yenagoa and Niger Delta University Teaching Hospital, Okolobiri, both in Bayelsa State, Nigeria. They are the two tertiary hospitals in Bayelsa State. It was conducted over a six-month period, from January to August, 2021. The main commission of these tertiary hospitals are service delivery, training and research. They both serve as referral centres for other hospitals in Bayelsa State and surrounding Rivers and Delta States. This was a prospective, descriptive, cross-sectional study. Infertile women that presented to the gynaecological clinic for evaluation of infertility, were referred to the Radiology department for hysterosalpingography as part of their investigations.

The sample size for this study was calculated using the formula:

$$n = z^2 pq/d^2 \quad [11]$$

Where:

n = minimum sample size
z = normal standard deviation set at 95% confidence limit = 1.96

p = prevalence of infertility which was 32% (0.32) from a previous study [12].
q = 1 – p (complementary probability).
d = margin of error = 5% = 0.05

Calculation:

$n = (1.96)^2 \times 0.32 \times 0.68 / (0.05)^2$
$n = 3.8416 \times 0.32 \times 0.68 / 0.0025$
$n = 0.8359 / 0.0025$
$n = 334.37$

After giving room for attrition of 15%, 'n' was adjusted to 380.

Therefore, 380 women being evaluated for infertility were randomly selected for this study from the gynaecological clinic. These women were recruited consecutively until the sample size was complete. Hysterosalpingography was performed for these women in both tertiary health institutions.

Infertile women referred for hysterosalpingography, and women that gave consent and completely filled the consent/questionnaire form were included in the study.

Exclusion criteria included abnormal uterine/vaginal bleeding before the procedure, on-going menstruation, pregnancy, discharge on inspection of the cervix, cervical stenosis/cervical pathology, evidence of pelvic inflammatory disease, previous history of contrast hypersensitivity, and all patients that declined consent or incompletely filled the consent form and questionnaire.

The nature of the study, the procedure and the likely benefits to the patients were explained to them. Written informed consent was obtained from the women that met the inclusion criteria. Their age, level of education, occupation, parity, body mass index and other patients' information were obtained and documented. Afterwards, they were referred to the Radiology Department for hysterosalpingography.

2.1 Procedure

Hysterosalpingography was carried out in the proliferative phase of the menstrual cycle (between the 7th and 10th day). The women were asked to fill the Beck's Anxiety Inventory (BAI) 30 minutes before the procedure [13]. It has a range of 0 to 63. A score of 0 – 7 suggests minimal level of anxiety, 8 – 15 suggests mild anxiety, 16 – 25 suggests moderate anxiety, and 26 – 63 suggests severe anxiety [13].

Protective lead apron and eye shield were put on. After passing urine to empty her urinary bladder, the patient was initially placed in the supine position on the X-ray table. The scout radiograph of the antero-posterior view of the pelvis was taken. She was then placed in the lithotomy position, and draped to ensure privacy. After hand-washing and putting on sterile gloves, under a good light source, a sterile Cusco's speculum was inserted into the vagina to expose the cervix.

The ecto-cervix was cleaned with savlon solution, and the anterior lip grasped with a tenaculum. A self-retaining cannula was inserted into the cervix, and the speculum was removed for the patient's comfort. Urographin, a water-soluble, high osmolar contrast medium (10 – 20 ml) was warmed to body temperature, and injected slowly into the endometrial cavity. Three radiographs to outline the endometrial cavity, fallopian tubes and intraperitoneal spillage were obtained respectively. The cannula was removed, the vulva was cleaned, and she was asked to dress up.

The hysterosalpingography films were reported by the Consultant Radiologist. The outcome of the procedure was discussed with the women. Thirty minutes after the procedure, the level of pain that the women felt were recorded with the use of the Numerical Rating Scale (Fig. 1) [14]. This is the commonest scale used in the grading of pain. The patient rates the level of pain on a scale of 0 – 10. A score of 0 indicates no pain, 1 – 3 suggests mild pain, 4 – 6 suggests moderate pain, 7 – 10 suggests severe pain [14].
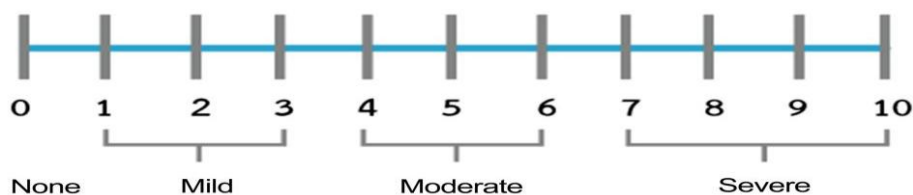

Fig. 1. Numerical Rating Scale (NRS) [14].

2.2 Data Analysis

Data were entered into a pre-designed proforma, and were analysed using Statistical Product and Service Solutions for windows® version 25 (SPSS Inc.; Chicago, USA). Results were presented in frequencies and percentages for categorical variables and mean and standard deviation for continuous variables. P-value less than 0.05 was taken as being statistically significant.

3. RESULTS

3.1 Sociodemographic Characteristics of Women Undergoing Hysterosalpingo graphy

There were 380 women who participated in the study. The mean age of the women was 35.8 years with a standard deviation of 4.5 years. The modal (39.7%) age group was between 30 and 34 years. Mean age of menarche among the women was 13.7 ± 2.1 years (Table 1). All the women were married and belonged to the Christian faith. Majority (71.6%) of the women had tertiary level of education, while very few (3.4%) of them had primary level of education. Most of the women were civil servant (44.2%), and were resident in Bayelsa State (89.2%).

Almost half (49.7%) of the women were overweight, while about a quarter (24.2%) were mildly obese. Mean body mass index was 27.4kg/m^2 with a standard deviation of 4.9 kg/m^2 (Table 1).

3.2 Gynaecological and Infertility-related Factors among the Women

Table 2 showed that of the 380 women who participated in the study, 154 (40.5%) women were nulliparous. More than half (54.5%) of the women have been married for five years or less, and almost 7 in 10 (69.5%) women were without a child.

Table 1. Sociodemographic characteristics and anthropometric indices of women undergoing hysterosalpingography

Characteristics	Frequency N = 380	Percent
Age group (years)		
< 30	13	3.4
30 – 34	151	39.7
35 – 39	135	35.5
> 40	81	21.3
Mean Age ± SD in years	35.8 ± 4.5	
Mean Age of Menarche ± SD in years	13.7 ± 2.1	
Level of education		
Primary	13	3.4
Secondary	95	25.0
Tertiary	272	71.6
Occupation		
Civil servant	168	44.2
Self-employed/Professional	40	10.5
Trader/Artisan	135	35.5
Unemployed	37	9.7
Body mass index categories		
Normal weight	86	22.6
Overweight	189	49.7
Class I obesity	92	24.2
Class II obesity	13	3.4
Class III obesity	0	0
Mean weight ± SD in kg	69.1 ± 13.5	
Mean height ± SD in m	1.58 ± 0.06	
Mean body mass index ± SD in kg/m^2	27.4 ± 4.9	
Residence		
Bayelsa	339	89.2
Outside Bayelsa	41	10.8

Two hundred and ninety-three (77.1%) women were referred for hysterosalpingography due to secondary infertility (Table 2), and about 3 in 10 (29.2%) women had infertility for more than 5 years.

3.3 Pre-procedure anxiety and Post-procedure Pain Scores in the Women

3.3.1 Pre-procedure anxiety score

The mean anxiety score using the Beck's Anxiety Inventory (BAI) 30 minutes before the procedure was 7.1 with a standard deviation of 5.4. Anxiety scores documented by participants ranged from 0 to 21 (Fig. 1, Table 3). Two hundred and forty-nine (65.5%) participants have minimal level of pre-procedure anxiety level (Table 3).

3.3.2 Post-procedure pain scores

The mean pain score recorded with the use of the Numerical Rating Pain Scale was 5.2 with a standard deviation of 2.7 (Fig. 2). Pain perception score ranged between 0 and 9. While twenty-one (5.5%) women felt no pain, 136 (35.8%) and 142 (37.4%) women indicated moderate to severe pain following hysterosalpingography.

3.4 Relationship between Pre-procedure Anxiety and Post-procedure Pain Scores

The pre-procedure anxiety scores showed significant, positive, and strong relationship with post-procedure pain scores, reflected in a correlation coefficient of 0.50 (p – 0.001) (Table 4 and Fig. 3).

The linear relationship between anxiety scores and pain scores is depicted in Figure 3. For every unit change in anxiety score, there was an estimated 25.4% change in the pain perception documented by the participants. For participants who had an anxiety score of 0, there was an average pain score of 3.45 (Fig. 3).

Table 2. Gynaecological and infertility-related factors among the women

| Characteristics	Frequency N = 380	Percent
Parity		
Nulliparity (No parous experience)	154	40.5
Primiparous (1 parous experience)	90	23.7
Multiparity (2 – 4 parous experiences)	108	28.4
Grand-multiparity (≥ 5 parous experiences)	28	7.4
Median parity (Range)	1 (0 – 10)	
Duration of marriage (years)		
≤ 5	207	54.5
6 – 10	132	34.7
11 – 15	24	6.3
≥ 16	17	4.5
Mean duration of marriage ± SD in years	6.1 ± 4.5	
Number of Children		
None	264	69.5
1 – 2	96	25.3
> 3	20	5.3
Type of infertility		
Primary	87	22.9
Secondary	293	77.1
Duration of infertility (years)		
≤ 5	269	70.8
6 – 10	95	25.0
11 – 15	16	4.2
Mean duration of infertility ± SD in years	4.5 ± 3.0	
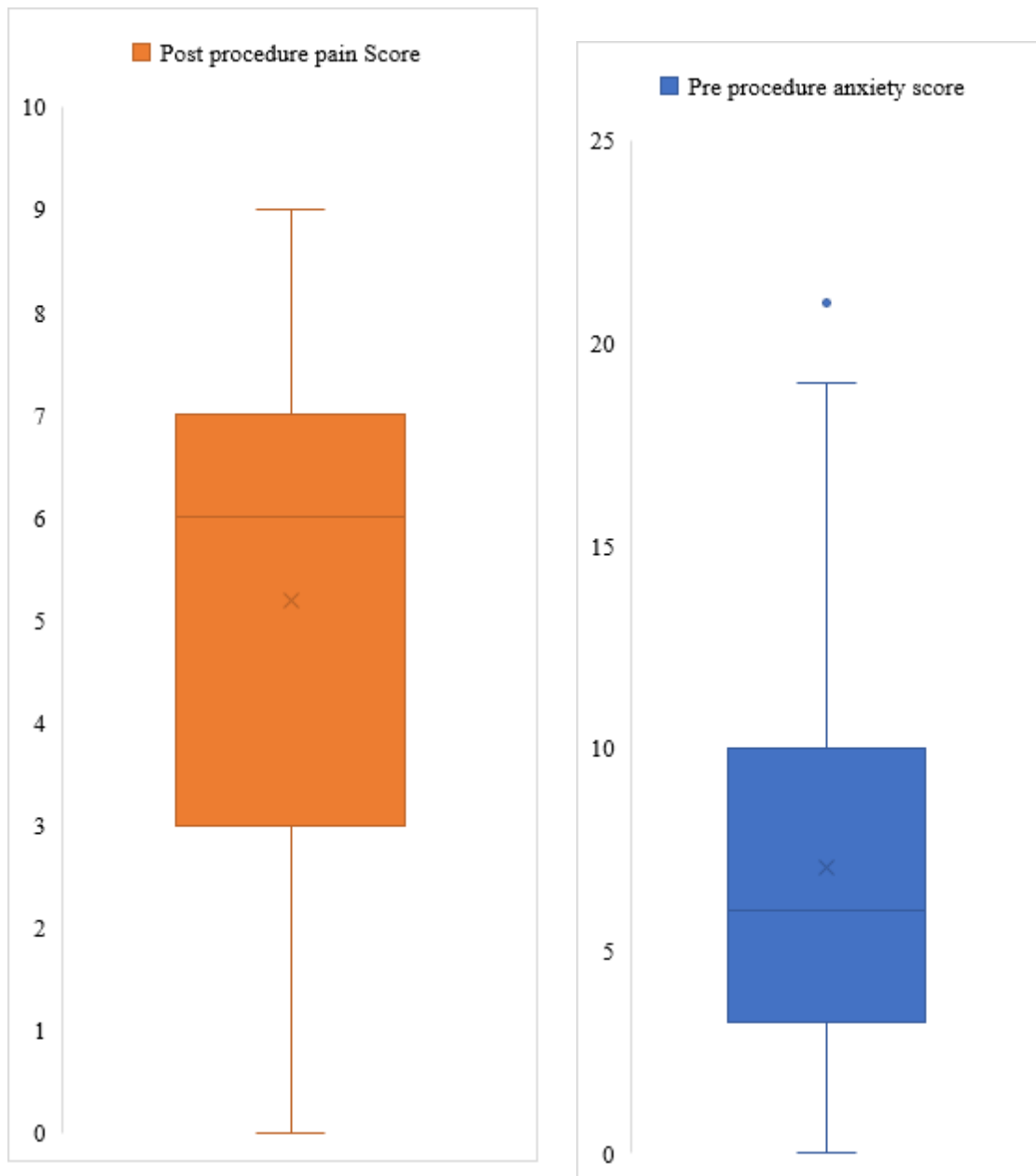
Fig. 2. Box and whisker chart showing the range of scores for pre-procedure anxiety and post-procedure pain among the women

Table 3. Pre-procedure anxiety and post-procedure pain scores and categories among the women

Variable	Frequency N = 380	Percent
Pre-procedure anxiety score categories		
Minimal	249	65.5
Mild	82	21.6
Moderate	49	12.9
Severe	0	0
Mean anxiety score ± SD	5.2 ± 2.7	
Pain score categories		
No pain	21	5.5
Mild Pain	81	21.3
Moderate Pain	136	35.8
Severe Pain	142	37.4
Mean pain score ± SD	7.1 ± 5.4	

Table 4. Relationship between pre-procedure anxiety and post-procedure pain scores

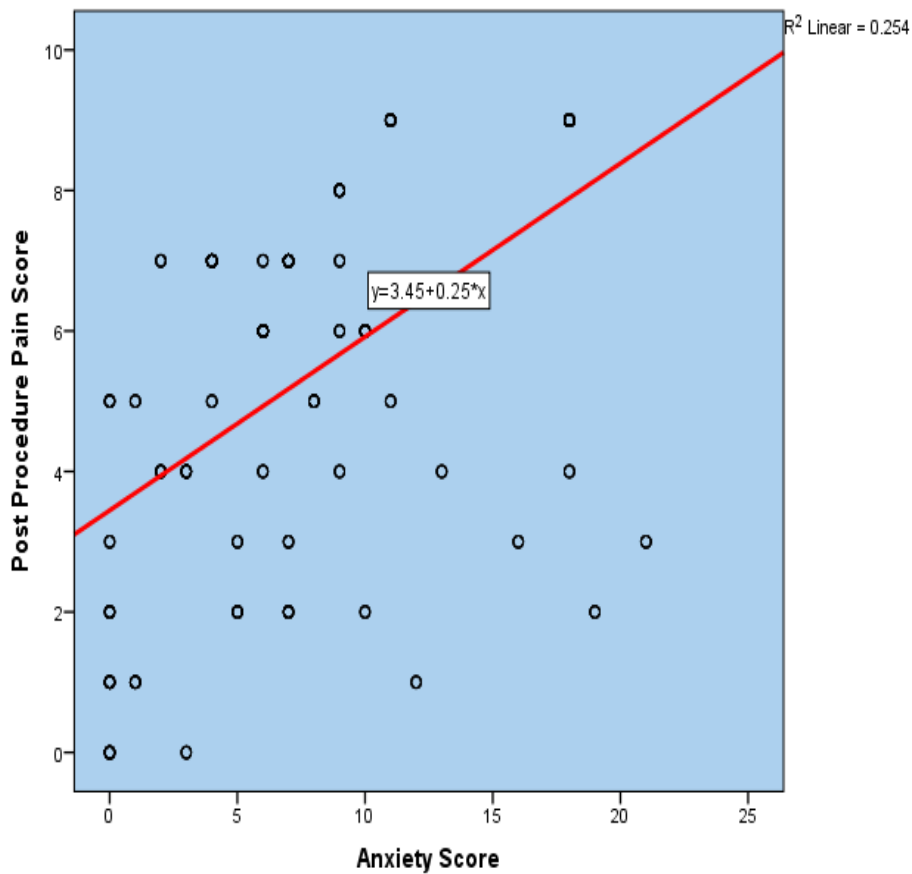| Characteristics	Correlation coefficient (p-Value)	β – coefficient (95% CI)	t – test (p-Value)
Anxiety score	0.50 (0.001)	0.25 (0.20 – 0.29)	11.34 (0.001)
Constant		3.45 (3.07 – 3.83)	17.79 (0.001)

Fig. 3. Relationship between pre-procedure anxiety and post-procedure pain

4. DISCUSSION

Majority of the women undergoing hysterosalpingography have significant level of anxiety and pain [2–4]. This study sought to determine if there was a relationship between pre-procedure anxiety levels and post-procedure pain. Our study revealed that there was a significant, positive, and strong relationship between pre-procedure anxiety and post-procedure pain [correlation coefficient of 0.50 (p – 0.001)]. This is in keeping with the report from the study of Tokmak et al..[7]. where there was significant positive correlation between the level of pre-procedure anxiety and the level of post-hysterosalpingography pain perception. Many authors and studies have reported that there was a positive correlation between the level of anxiety and pain perception [15–22]. The reason for this lies in the fact that in the presence of anxiety, there is activation of the sympathetic nervous system. This activation relays a neural signal through the hypothalamus to stimulate the release of preganglionic acetylcholine, which is a neurotransmitter. Acetylcholine, in turn stimulates the release of epinephrine and norepinephrine, which are catecholamines from the adrenal cortex.[23,24] In the body, adrenergic receptor-mediated mechanical hyperalgesia is produced by epinephrine. The level of epinephrine determines the degree of algesia [25].

Apart from the pre-procedure anxiety that is associated with hysterosalpingography, infertility itself causes a lot of stress. In fact, the risk of depression, anxiety, and distress is high in women being evaluated for infertility [26]. In a previous study, 40.2% of women had anxiety, depression or both just before their first infertility clinic visit [27]. Another research conducted among women being evaluated for infertility reported a 30.8% prevalence rate of psychiatric disorders, most of which was depression.[28] A recent research on the prevalence of psychological features among women on investigation for infertility reported that 25% – 60% of them had psychiatric symptoms and that their levels of anxiety and depression were markedly higher than those of their fertile counterparts [29].

Infertility is a biomedical, psychological, cultural and social problem, especially in our cultural setting where emphasis is made on the needs and desires of a group as a whole rather than the needs and desires of a single individual [30]. Culture plays a very important and major role in infertility in our subregion. In the Western world, infertility is regarded as a medical problem. However, from actual experiences in our culture in Nigeria, it is considered an abomination for a woman not to conceive and bear children. Our culture sees fertility as a social and cultural occurrence rather than biological. Infertile women are faced with intense family and sociocultural issues. They are blamed for infertility, irrespective of the aetiology. This leads to a lot of anxiety, stress, frustration, grief, depression, social stigma and personal insecurities. It may also lead to divorce or her husband marrying a second wife that will bear him children. At the demise of the husband, the infertile woman or the woman without a son is deprived of her husband's wealth. In the traditional Nigerian society, a woman's position in the family is secured when she has children, especially when at least one of the children is a male.

The mean age of the women that participated in the study was 35.8 ± 4.5, which is within the reproductive age group. In 2018, half of the rural women in Nigeria had their first child at 19-year-old, while the median age at first childbirth was 22.3-year-old for the women in the urban areas [31]. As at 2020, Nigeria's fertility rate was 5.2 children per woman [32]. Hysterosalpingography is mainly carried out in women of reproductive age group. Most (96.6%) of the women in this study were above the age of 30 years. The plausible reason for this is that, as women advance in age, there is increase in the population with age-related infertility, necessitating evaluation and referral for investigations, which include hysterosalpingography [33].

In our study, most of the women had tertiary level of education, which is in tandem with studies on infertility from different regions of Nigeria [6,34,35]. A contributing factor to this may be because many women want to reach the pick of their career before considering pregnancy; and by the time they are ready, age-related infertility may have set in. Majority of the women in our study had secondary infertility. This may have resulted from the fact that many women in our locality either had a premarital unsafe abortion or had previous deliveries at traditional birth attendant's place(s) or at home, which are unhygienic places [34]. These unhygienic places predispose them to pelvic infection and tubal factor infertility, necessitating evaluation with hysterosalpingography [34].

The strength of this survey lies in the fact that it is a two-centre prospective study. Only two consultant radiologists did the hysterosalpingography. This reduced bias, and increased the reproducibility of this investigative modality.

The limitation of this study is that it is hospital-based. Therefore, the findings cannot be used to draw general conclusions in the population of infertile women. A multi-centre randomised control trial with a larger sample size will be more representative.

5. CONCLUSION

This study established a positive correlation between pre-hysterosalpingography anxiety scores and post-hysterosalpingography pain scores. Therefore, adequate counselling on the nature of the procedure, possible complications and the likely benefits to the patient will help reduce the level of anxiety, and subsequently post-procedure pain.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The research work was examined and approved by the research and ethics committee of the hospitals.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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