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ScienceDirect

Journal of the Chinese Medical Association 77 (2014) 477–481

www.jcma-online.com

Original Article

Impact of preprocedural anxiety levels on pain perception in patients undergoing office hysteroscopy

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Received January 8, 2014; accepted May 12, 2014

Abstract

Background: We aimed to determine if preprocedural anxiety levels had a significant association with procedure-related pain in women undergoing office hysteroscopy (OH) and also to assess the effect of various clinical factors on pain perception in these women.
Methods: There were 148 women undergoing OH enrolled in this observational study. Before examination, patients were asked to complete two forms, the STAI-T (State–Trait Anxiety Inventory, Trait) and STAI-S (State-Trait Anxiety Inventory, State) anxiety scales, to evaluate their usual anxiety state and state of anxiety during the examination. Patients were asked to quantify on a visual analog scale the pain felt during and 60 minutes after the procedure. Associations between STAI and visual analog scale scores were assessed using correlation analysis. The effects of various contributing factors on pain perception were investigated with linear regression analysis. A p value < 0.05 was considered statistically significant.
Results: The preprocedural mean trait and state anxiety scores were 38.4 ± 9.2 and 44.8 ± 10.0, respectively, and the mean patient age was 43.6 ± 3.3 years. During OH, there were significant positive correlations between in-hospital waiting time, procedure time, preprocedural trait or state anxiety scores, and pain. Sixty minutes after OH, significant positive correlations between in-hospital waiting time, procedure time, preprocedural state or trait anxiety scores, and pain were observed. There was also a significant negative correlation between parity and procedure-related pain 60 minutes after procedure. OH-related pain scores during the procedure were significantly affected by in-hospital waiting time ($p < 0.001$), state anxiety level ($p = 0.001$), and trait anxiety level ($p = 0.01$). However, 60 minutes after the procedure, pain was affected by patient parity ($p = 0.02$), procedure time ($p = 0.002$), and preprocedural state anxiety level ($p < 0.001$).
Conclusion: The pain that study participants felt during and soon after OH was negatively affected by preprocedural anxiety levels. Some factors, such as reducing the waiting time before the procedure, might be useful in reducing anxiety levels.

Keywords: anxiety; office hysteroscopy; pain perception

1. Introduction

Hysteroscopy, a procedure that allows for direct visualization of the uterine cavity, is accepted as the gold standard for assessment of intrauterine pathologies. The ability to perform the procedure in an office setting without the use of any anesthesia has made this examination simple, quick, economical, and also safer for the patient. Although the technological improvements have greatly reduced the patient pain and discomfort during office hysteroscopy, including the use of thinner and flexible instruments with no-touch technique, pain still remains a significant determinant of this procedure's general acceptability.[1]

Conflicts of interest: The authors declare that there are no conflicts of interest related to the subject matter or materials discussed in this article.

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http://dx.doi.org/10.1016/j.jcma.2014.07.004

It has been previously reported that patients with no parity, previous cesarean delivery, menopausal status, increased anxiety, and chronic pelvic pain may carry a greater risk of experiencing pain during office hysteroscopy.[2] It is obvious that reducing anxiety has a positive psychological impact for women undergoing OH. However, to what extent anxiety may affect pain experienced by patients during this procedure remains unclear. The aim of this study therefore was to determine the impact of preprocedural anxiety levels on pain perception in women undergoing OH and to investigate the possible contributing factors relating to pain perception in these women.

2. Methods

Between April 2013 and September 2013, 148 patients with medical indication for OH (abnormal uterine bleeding) were enrolled into the patient group of this observational study. The study was carried out according to the regulations of the local ethics committee of our institution and written informed consent was obtained from all participants. Women were excluded if they were nulliparous, had previous cesarean delivery, were being treated for anxiety or any psychiatric diseases, had a history of chronic pelvic pain or dysmenorrhea, had reached menopause, had a previous hysteroscopic examination, had genital infection, cervical stenosis or history of cervical surgery, or did not agree to participate in the study.

Anxiety was measured using the Spielberger State-Trait Anxiety Inventory (STAI) questionnaire form, which consists of two subscales. State anxiety (STAI-S) is a measure of situational anxiety with participants being asked to respond based on "how you feel right now". Trait anxiety (STAI-T) is a measure of a general tendency to be anxious with participants being asked to respond based on "how you generally feel".[3] Each subscale consists of 20 items scored on a four-point Likert-type scale; thus the range of possible scores on each subscale is from 20 (low anxiety) to 80 (high anxiety).

On the day of OH, a verbal explanation of the procedure and an information sheet were given to all women by the same nurse and written consent was obtained. The participant completed the STAI-forms at that time. The duration between the time that the nurse started to give information about the procedure and the moment that the procedure began was calculated as in-hospital waiting time. Before performing OH, patient basal blood pressure and heart rate was measured. With the patient lying in a lithotomic position, a bimanual pelvic examination was performed; the cervix was then visualized through a small-size vaginal speculum. At this point the hysteroscope was introduced into the uterine cavity without dilating the cervix or using a tenaculum. No pharmacological preparations or local anesthesia were administered before the examination. All women were examined between the 5th menstrual cycle day and 10th menstrual cycle day. A rigid, 3-mm outer diameter with a 30° fore–oblique view hysteroscope was used. Uterine distension was maintained by a steady stream of 1.5% glycine solution. All procedures were observed using a television monitor by the operator and patient, and all examinations were performed by the same operator (M.K.K.).

All patients were observed for 60 minutes after the procedure and they were asked to score a visual analog scale (VAS) to evaluate the worst pain experienced during and 60 minutes after the procedure. The VAS was a 10-cm printed horizontal line with major and minor tick marks at each cm and mm, respectively, representing a linear continuum from no pain at all (left end, numeric value 0) to maximum pain (right end, numeric value 10); patients were asked after the procedure to place a mark across an unmarked VAS using a pen, at the point they felt most consistent with their experienced pain level. No further follow-up was scheduled. No woman was excluded and no complications were reported during the study.

SPSS version 17.0 for Windows (SPSS Inc., Chicago, IL, USA).was used for statistical analysis of the study data. Numeric variables are stated as mean ± standard deviation, and categorical variables were expressed as number and percentage. After descriptive tests were completed, the Kolmogorov–Smirnov test was used to determine the data distributions. Pearson's correlation test was used to assess correlations. The effects of different factors on pain were assessed using a linear regression model. A p value < 0.05 was considered statistically significant.

3. Results

A total of 148 women who underwent OH for abnormal uterine bleeding were enrolled in this study. The women's age was 43.6 ± 3.3 years. In-hospital waiting time for the procedure was 51.2 ± 26.4 minutes. Preprocedural trait and state anxiety mean scores were 38.4 ± 9.2 and 44.8 ± 10.0, respectively. VAS scores during and 60 minutes after OH were 5.3 ± 2.8 and 1.5 ± 1.7, respectively. The other characteristics of the study population are presented in Table 1.

During OH, there were significant positive correlations between in-hospital waiting time, procedure time, preprocedural trait–state anxiety levels and procedure-related pain. However, patient age, parity, or education level did not have a significant correlation with pain (Table 2).

Table 1
Patient characteristics.

Variables		
Age (y)		43.6 ± 3.3
Parity (n)		2.4 ± 1.0
Education	Elementary school	33 (22.3)
	Middle school	49 (33.1)
	High school	38 (25.7)
	University	28 (18.9)
Employment	None	56 (37.8)
	Employed	92 (62.2)
In-hospital waiting time (min)		51.2 ± 26.4
Procedure time (min)		7.6 ± 3.1
STAI-T (n)		38.4 ± 9.2
STAI-S (n)		44.8 ± 10.0
VAS score during procedure (n)		5.3 ± 2.8
VAS score 60 min after procedure (n)		1.5 ± 1.7

Values are presented as mean ± standard deviation or n (%).
STAI-T and STAI-S = State–Trait Anxiety Inventory: Trait and State, respectively; VAS = visual analog scale.

Table 2
Correlation between the characteristics and visual analog scale (VAS) scores during procedure and 60 minutes after procedure of the study population.

	VAS score during procedure		VAS score 60 min after	
	r	p*	r	p*
Age	0.025	0.38	0.124	0.07
Parity	−0.006	0.47	−0.233	0.002
Education	−0.042	0.31	−0.041	0.31
In-hospital waiting time	0.599	< 0.001	0.182	0.01
Procedure time	0.242	0.002	0.224	0.003
STAI–T	0.687	< 0.001	0.787	< 0.001
STAI–S	0.687	< 0.001	0.674	< 0.001

*$p < 0.05$ was considered statistically significant.
STAI-T and STAI-S = State–Trait Anxiety Inventory: Trait and State, respectively.

Sixty minutes after OH, statistically significant positive correlations between pain and in-hospital waiting time, procedure time, and preprocedural trait or state anxiety levels were observed. Patient age and education level did not have a significant correlation with pain. There was also a significant negative correlation between parity and procedure-related pain (Table 2).

On linear regression analysis, trait and state anxiety levels were not affected by patient age, education level, employment, parity, in-hospital waiting duration, or procedure time. In addition, OH related pain VAS scores during procedure were significantly affected by in-hospital waiting time [$\beta = 0.050$, standard error (SE) = 0.005, 95% confidence interval (CI) for $\beta = 0.040–0.060$, $p < 0.001$], trait anxiety level ($\beta = 0.110$, SE = 0.031, 95% CI for $\beta = 0.049–0.172$, $p = 0.001$) and state anxiety level ($\beta = 0.074$, SE = 0.029, 95% CI for $\beta = 0.017–0.130$, $p = 0.01$; Table 3). However, 60 minutes after the procedure, the in-hospital waiting time ($p = 0.50$) and preprocedural state anxiety level ($p = 0.41$) did not resume to affect the procedure related pain (Table 4). Sixty minutes after the procedure, perceived pain was affected by patient parity ($\beta = -0.276$, SE = 0.121, 95% CI for $\beta = -0.514–-0.037$, $p = 0.02$), procedure time ($\beta = 0.124$, SE = 0.039, 95% CI for $\beta = 0.047–0.201$, $p = 0.002$), and preprocedural trait anxiety level ($\beta = 0.138$, SE = 0.028, 95% CI for $\beta = 0.083–0.193$, $p < 0.001$; Table 4).

Table 3
Linear regression analysis results between characteristics and visual analog scale score during procedure of the study population.

$R^2 = 0.721$	β	SE	95% CI for β	p*
In-hospital waiting time	0.050	0.005	0.040–0.060	< 0.001
Procedure time	0.021	0.043	−0.063–0.106	0.62
STAI-T	0.110	0.031	0.049–0.172	0.001
STAI-S	0.074	0.029	0.017–0.130	0.01

*$p < 0.05$ was considered statistically significant.
R2 = 0.721 in this model.
CI = confidence interval; R^2 = coefficient of determination; SE = standard error; STAI-T and STAI-S = State–Trait Anxiety Inventory: Trait and State, respectively.

Table 4
Linear regression analysis results between characteristics and visual analog scale score 60 minutes after procedure of the study population.

$R^2 = 0.742$	β	SE	95% CI for β	p*
Parity	−0.276	0.121	−0.514–0.037	0.02
In-hospital waiting time	−0.003	0.004	−0.012–0.006	0.50
Procedure time	0.124	0.039	0.047–0.201	0.002
STAI-T	0.138	0.028	0.083–0.193	< 0.001
STAI-S	−0.021	0.025	−0.071–0.029	0.41

*$p < 0.05$ was considered statistically significant.
CI = confidence interval; OR = odds ratio; R^2 = coefficient of determination; SE = standard error; STAI-T and STAI-S = State–Trait Anxiety Inventory: Trait and State, respectively.

4. Discussion

In this study, we measured state anxiety (responsiveness to the immediate situation) and trait anxiety (the more general level for that individual) in women before OH, and evaluated the associations with patients' pain perception during and 60 minutes after the procedure. We found that the patients in our population experienced higher state and trait anxiety levels than the normal female population; however, both of the anxiety levels were similar to those of general medical and surgical patients.[3] All diagnostic medical procedures have been previously shown to provoke excessive anxiety levels in patients,[4–6] and it is therefore not surprising that OH precipitates similar levels of anxiety. This increased anxiety may be attributable to the expectation that increasingly invasive procedures will be performed in the outpatient setting and the fear of a serious underlying condition.

There were significant positive correlations between the state or trait anxiety and pain scores during or 60 minutes after the procedure. Clinical and experimental studies of pain perception have found that an increasing state anxiety is often associated with increased pain reports[7,8] and higher trait anxiety also exacerbates pain.[9] This is because there is a biological interconnection between the physiological effects of anxiety and pain perception. Acute emotional anxiety causes activation of the sympathetic nervous system. In turn, the sympathetic nervous system will relay a neural signal via the hypothalamus to stimulate preganglionic release of the neurotransmitter acetylcholine, that will further promote catecholamine release of epinephrine and norepinephrine from the adrenal cortex.[10,11] Epinephrine has been shown to produce adrenergic receptor-mediated mechanical hyperalgesia and sensitization of nociceptor-like neurons in the body hyperalgesia is dependent on the epinephrine level in the body, and measurable effects are almost immediate.[12] Thus, anxiety increases pain perception through physiologic mechanisms, mainly by activation of an adrenergic response.

In our study, it has been shown that pain perception during the procedure is affected by state and trait anxiety levels. However, the effectiveness of preprocedural state anxiety was maintained on pain perception 60 minutes after the procedure, whereas the impact of trait anxiety levels stopped soon after the procedure. These results reflect that trait anxiety is present before the procedure, and is associated with chronicity of pain. On the contrary,

state anxiety, which is a transitory emotion characterized by physiological arousal and consciously perceived feelings of apprehension, can be changed by situational factors, which consists of feelings tension and worry and does not have a continuous effect on pain perception.[3] Tang and Gibson[13] also reported that trait and state anxiety have independent effects on pain perception. However, higher state anxiety exacerbates an individual's sensitivity to pain, and the association between state anxiety and pain perception is modulated by trait anxiety.[13] According to another multidimensional interaction model of anxiety, the situation must be congruent with the facet of the trait anxiety to induce an increase in state anxiety. In other words, trait anxiety cannot be directly observed but manifests as state anxiety when stress is experienced.[14]

In a recent observational study by Carta et al,[15] a statistically significant positive correlation between pain during OH and waiting time for the procedure was observed. Furthermore, it was reported that OH was associated with a significant level of anxiety that could affect the pain tolerability of the patient being examined. However, some factors such as reducing the waiting time would have a positive effect on patient compliance by making hysteroscopy easier.[15] Similarly, we found that longer in-hospital waiting time before OH is associated with higher VAS scores during and soon after the OH and pain perception during the procedure was significantly affected by in-hospital-waiting time. Waiting time for a diagnostic medical procedure is a stressful period that leads to an uncomfortable procedure by increasing anxiety. This negative effect of waiting time may be related to uncertainty and some items such as informing the patient about the procedure and knowing what might happen during and after the procedure may be useful. In our study, all women were informed about the procedure on the day of OH. Harkness et al[16] has shown that early education by a nurse significantly reduces the state anxiety. Thus, the time of giving information seems to be important. This suggests that future studies should aim to investigate the appropriate time for giving information in order to lower preprocedural anxiety.

Pain VAS scores assessed 60 minutes after the procedure were affected by the parity of woman and the procedure time. The contractions occurred as the procedural device passed through the cervical canal and distention of uterine cavity may cause perceived pain.[17] Also, in women who have had previous vaginal deliveries, the cervix is more dilated.[18] Thus women with a shorter procedure time involving a more comfortable and tolerable procedure and parous women in which the procedure could be more easily performed were more likely to experience less pain, especially soon after the procedure.

The perception of pain during the OH can be reduced more effectively by proper preexamination intervention. In a prospective randomized trial, it was reported that music therapy was useful as a complementary method to control anxiety and reduce OH-related pain perception.[19] Additionally, relaxation training, in which participants are trained to reduce both their autonomic arousal and anxiety levels by controlled breathing or progressive muscle relaxation, has been shown to be an efficacious treatment for pain.[20]

In our study, we measured the blood pressure and heart rate of patients before OH. However, as no medical complication was observed before, during, or after the procedure, we did not again evaluate or assess patient vital signs after the first pre-OH assessment. This was a limitation of our study. Future studies investigating anxiety should include vital sign parameters that could be a satisfactory representation of anxiety.

In conclusion, we have found that trait and state anxiety have been shown to affect OH-related pain perception. This means that increasing anxiety levels are associated with increasing pain perception. However, efforts to affect some of these factors such as reducing the waiting time might be beneficial in that they could act to reduce preprocedural anxiety levels. Further research is needed to assess the management of these symptoms and their impact on the well-being of women in this setting.

Acknowledgments

We would like to thank Yusuf Celik, PhD (Head of Biostatistcs and Medical Informatics in Dicle University School of Medicine, Diyarbakır, Turkey) for his revision of the statistics of the manuscript.

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