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Does preoperative psychological status of patients affect postoperative pain? A prospective study from the Caribbean

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Abstract

Objectives: Patients with high anxiety states in the preoperative period often have more intense postoperative pain, despite adequate pain control during the intraoperative period. This study aimed to determine the relationship between the preoperative psychological status and the pain experienced postoperatively in a sample of Caribbean patients.

Design and methods: A prospective study was conducted in elective surgical adult patients at a teaching hospital in the Caribbean. Patients' preoperative psychological status was assessed using Hospital Anxiety and Depression Scale (HADS), and a preoperative 'expected' pain score was recorded. Postoperatively, 'observed' pain scores at 4 and 24 hours and the maximum pain score during 24 hours were recorded. Demographic data and clinical details including data regarding postoperative analgesia were collected. Expected and observed pain scores were compared between patients with and without anxiety and depression.

Results: A total of 304 patients were enrolled. The overall prevalence of anxiety and depression was 43% and 27%, respectively, based on the HADS scores. There were significant associations between the postoperative pain scores and factors such as preoperative anxiety and depression (HADS) scores, preoperative expected pain scores, patient educational level, presence of preoperative pain and surgical duration. Age, gender, ethnicity and type of anaesthesia did not impact postoperative pain scores.

Conclusion: The presence of preoperative anxiety and depression as indicated by HADS score may significantly influence postoperative pain. Other factors such as educational level, presence of preoperative pain and surgical duration may also impact postoperative pain. Some of these factors may be modifiable and must be addressed in the preoperative period.

Keywords

Acute pain, postoperative pain, preoperative anxiety, preoperative depression, preoperative expectation of pain

Introduction

Anaesthetists encounter patients with varying personalities and emotional states during the time of preanaesthetic evaluation. Preoperative assessments are performed to tailor the most appropriate and safest anaesthetic plan, which are specific to the patient as well as the procedure. This plan is then executed with an aim of ensuring patients having adequate analgesia during the intraoperative and postoperative periods.

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For the most part, when patients are comfortable and stable postoperatively, anaesthetists do imagine that their analgesic plan might have been optimal. However, there may be patients who experience severe pain postoperatively, albeit they may not explicitly state it.

The definition of pain by the International Association for the Study of Pain (IASP) includes two components: 'the objective physiologic sensory aspects' and the 'subjective emotional and psychological components'.¹ This complex nature of pain experience might account for the well-observed difference in the perioperative pain states when some patients never complain while others complain of uncontrolled pain, despite adequate pharmacological management with recommended doses of analgesic drugs. Although this may be due to insufficient analgesia in a specific patient, there is a possibility that the subjective emotional components of pain may flare up during the postoperative period. Hence, it can be safely stated that capturing and addressing the factors contributing to the emotional component of pain in the preoperative period may assist in better managing the pain in the postoperative period.

There is controversy whether any biopsychosocial model of pain explains the 'exact' living experience of pain.² Such an exact living pain experience can be influenced by multiple patient factors including their psychological states and other environmental factors.

Previous research has found preoperative depression in patients to be often associated with increased postoperative pain.³ Many other psychological factors such as anxiety, mood disorders, preoperative neuroticism and psychosocial vulnerability may influence how surgical patients experience acute postoperative pain.⁴ In addition to demographic factors such as age, gender and marital status, other factors such as the presence of preoperative pain, thermal threshold and pain response to heat stimuli can be some important preoperative predictors of postoperative pain intensity, as well as patient dissatisfaction of the postoperative analgesia.⁵⁻⁸

Although awareness among patients has considerably improved in the past decade, most countries in the Caribbean neither have established hospital-based Acute Pain Management programmes nor Pain Clinics. A recent survey in Trinidad found a high prevalence of chronic pain in patients attending outpatient clinics in the major hospitals.⁹ Despite this, there is lack of interventional pain management specialists in Trinidad and Tobago and many other small island nations; some of them do depend on visiting specialists from abroad. Traditionally, surgeons manage the acute post-surgical pain, while General Practitioners and other specialists manage chronic pain, predominantly by pharmacotherapy.

Most nations in the Caribbean, especially Trinidad and Tobago, have people of multi-ethnic origin including African Americans, Asian Indians, Chinese, Middle-eastern descent and so on. A previous report has shown that the threshold and experience of pain may vary between different cultures and ethnicities.¹⁰ Furthermore, published data from Caribbean relating to factors affecting acute postoperative pain are sparse; the cultural components in this population may differ from the other patient populations in the literature since, as mentioned earlier, the pain experience is likely to vary according to different cultural backgrounds.

With this background, this study sought to identify the preoperative factors including anxiety and depression, affecting postoperative pain in patients undergoing elective surgery at a tertiary care teaching hospital in Trinidad. The aim was to identify significant relationships between the various patient factors and the incidence and severity of postoperative pain.

Methods

The study was approved by the Ethics Committee of the Faculty of Medical Sciences, The University of the West Indies, St. Augustine, and the Clinical Governance and Ethics Committee of the South West Regional Health Authority, Trinidad. Written informed consent was obtained from all participants, and patient confidentiality was maintained using assigned code numbers.

Design

The study was prospectively conducted during a 4-month period in 2012 at the San Fernando General Hospital, Trinidad, which is a public teaching hospital affiliated to the University of the West Indies.

Participants – inclusion and exclusion criteria

Patients on the elective surgical lists between the ages of 18 and 70 years belonging to American Society of Anesthesiologists (ASA) Grades I–III, who consented to participate in the study and able to perform pain scores without external influence, were included. These included ambulatory patients (discharged from hospital <24 hours post-surgery).

Patients were excluded if they underwent emergency surgery, ASA IV or V, had local anaesthetic procedures or sedation-analgesia not involving an anaesthetist, refused to participate in the study and were unable to perform pain scales on their own.

Materials and measures

This study utilised the Hospital Anxiety and Depression Scale (HADS) form to capture the preoperative psychological status of the patient.¹¹

The HADS

The HADS is a 14-item self-administered questionnaire designed to screen hospital patients for anxiety and depression, with seven questions addressing anxiety and seven questions addressing depression (related mainly to anhedonia, which is the reduced capability or possibly the complete inability to enjoy the things or experience pleasure, particularly concerning the activities that an individual previously enjoyed. Activities may include exercise, hobbies, sexual activities or social interactions).^{11–13} Each item has four responses with assigned values ranging from 0 to 3, in either ascending or descending order. The responses to all the questions pertaining to each mood were then summated (results ranged from 0 to 21 for each mood). The results were then categorised based on established groups: normal (scores from 0 to 7), borderline abnormal (scores from 8 to 10) and abnormal (scores from 11 to 21). This questionnaire has been validated in various populations as a simple tool for assessment of mood.^{14–18}

Pain assessment

The assessment of intensity of pain was conducted using a pain scale, incorporating a Numerical Rating Scale (NRS) with numbers ranging from 0 to 10.¹⁹ This scale has been validated and is used internationally to assess pain in the postoperative period. It has also been shown that the NRS and the Visual Analogue Scale (VAS) correlate well and are equally sensitive in the assessment of acute post-surgical pain.^{20–23}

Procedures

The conduct of anaesthesia and patient management was decided by the individual anaesthetists. Standard drugs were used including propofol, midazolam, thiopentone, fentanyl, morphine or pethidine, cisatracurium and suxamethonium. Anaesthesia was maintained with sevoflurane or isoflurane, with air or nitrous oxide supplementing oxygen. Other analgesic drugs included intravenous diclofenac and tramadol.

Subarachnoid anaesthesia was conducted utilising 25-gauge Sprötte spinal needles via a single-injection technique. The drugs utilised were fentanyl (12.5–25 µg intrathecally) and 0.5% heavy bupivacaine. Epidural anaesthesia was performed using a loss of resistance with saline technique utilising 18-gauge or

16-gauge Tuohy needles and catheters. The drugs utilised were bupivacaine (concentrations vary from 0.125% to 0.5%) and fentanyl.

Most peripheral nerve blockade techniques were usually performed utilising the peripheral nerve stimulator and/or ultrasound guidance with lidocaine and/or bupivacaine.

Postoperatively, acute pain management was decided and prescribed by the primary surgical team since an acute pain service is not available in this hospital. Analgesia was administered by the nursing staff as there were no patient-controlled analgesia pumps available during the study period. The drugs commonly administered included morphine, pethidine, tramadol via the intramuscular route, with an antiemetic such as dimenhydrinate or metoclopramide. Other analgesics utilised included non-steroidal anti-inflammatory drugs, either orally or parenterally, such as paracetamol, diclofenac (intravenous (IV)/intramuscular (IM)) and meloxicam (per os (PO)), and etoricoxib.

For patients who were discharged before 24 hours post-surgery, a telephone interview was conducted to assess the pain scores at 24 hours post-surgery as well as the worst pain during the first 24 hours following surgery. Analgesia required during this period was also recorded.

Data collection

In the preoperative period, the patient demographic data including age, gender and educational status were recorded initially and a questionnaire was used for the assessment of 'expected pain score' and the HADS. The HADS questionnaire was administered by a single investigator to prevent misunderstanding of the questions by patients and also to assist patients who were unable to manually fill in the questionnaire.

Intraoperative data recorded include surgical and anaesthetic procedures and drugs used. During the postoperative period, in the Post-Anaesthesia Care Unit (PACU), assessments of pain were done using the Numerical Pain Rating Scale, 4 and 24 hours post-surgery, and also the worst/maximum pain experienced within the 24 hours following surgery was recorded. Other postoperative data included documented analgesia in the PACU and general wards until 24 hours. Data were collected by one investigator to minimise bias.

Statistical analyses

The sample size was calculated using a previous study which had utilised the HADS.³ The calculated sample size was 288, to detect significant differences in the

Figure 1. Prevalence of anxiety and depression based on the HADS scores.

postoperative pain (NRS of at least 2 in the scale of 0–10) between groups with and without anxiety and depression, with a study power of 0.8, alpha value of 0.05 and t-value of 1.96. This sample size was rounded to 300 patients to compensate for the event of attrition due to incomplete questionnaires.

Data were analysed using Statistical Package for Social Sciences, Version 12 (SPSS Inc., Chicago, IL, USA). Descriptive analyses were done and presented in the form of mean and standard deviation (SD) or median and interquartile ranges (IQRs) (depending on the distributional properties of data) for continuous variables and n (%) for categorical variables. Inferential analyses included bivariate analyses (Spearman's rho), Mann–Whitney U test and Kruskal–Wallis tests depending on the number of groups analysed. Multivariate linear regression analyses were done to assess the relationships between demographic, anaesthetic and surgical factors; HADS scores for anxiety and depression; and expected and observed postoperative pain scores. Statistical significance was fixed at an alpha level of 0.05.

Results

During the study period, 374 patients were approached to participate in the study. Of these, 344 gave consent to participate in the study, while 304 questionnaires were fully completed. Reasons for non-completion of the 40 questionnaires included cancellation of surgery for the day/week (33), procedures done without anaesthetist input (3), postoperative intensive care unit (ICU) admission (2) and patient withdrawal (2). Nine fully completed questionnaires were also excluded from inferential analyses due to smaller number of patients (in the specialties of vascular surgery (6) and obstetrics (3)).

Most patients belonged to the surgical specialties of General Surgery, Orthopaedics and Gynaecology.

The number of previous surgeries ranged from 0 to 9; 34% had surgery for the first time. Preoperative pain was present in 40% of the subjects; 21% related to a surgical cause, and 16.4% had non-surgical pain. Current analgesic use was noted in 18% of the patients.

The age of the patients ranged from 18 to 70 years (mean (SD): 44.9 (13.2) years); the largest proportion (25%) was in the 51–60 years age-group; 67.4% were females and 29% of them were 'home-makers'; 42% had completed secondary school level education. Patients of Indo-Trinidadian ethnicity were 50%, while 23% were Afro-Trinidadians.

About 51% of surgical procedures were performed by Consultant Surgeons and 57% of anaesthesia was conducted by Registrar level staff. General anaesthesia was the most common anaesthetic technique (57%) followed by central neuraxial anaesthesia (32%).

The HADS anxiety scores ranged from 0 to 18 with a median of 7 (IQR: 4, 10), and the HADS depression scores ranged from 0 to 17 with a median of 4 (IQR: 1, 8). Figure 1 shows the distribution of various categories of anxiety and depression according to the HADS scores. Patients with scores 0–7 on the HADS scale were considered normal, patients with scores 8–10 were considered to have borderline abnormality and those with HADS > 10 were considered to be abnormal. For the purpose of analysis, patients with borderline as well as abnormal HADS scores were categorised to have anxiety/depression. According to this categorisation, the overall prevalence of anxiety was 43%, and depression was prevalent in 27% of the subjects.

For the purpose of assessment of the severity of pain, '0' pain score was considered 'no pain', 1–3 were categorised as 'mild' pain, 4–6 were assigned to the category of 'moderate' pain and 7–10 as 'severe' pain.²⁴ Following this categorisation and according to the maximum pain score observed during the postoperative period, 3.9% had 'no pain', 8.9% had 'mild pain', 22.7% had 'moderate pain' and 64.5% had 'severe

Table 1. Pain scores in patients with and without anxiety and depression.

Parameter	Overall (n=304), median (IQR)	Anxiety present (n=131), median (IQR)	No anxiety (n=173), median (IQR)	Depression present (n=82), median (IQR)	No depression (n=222), median (IQR)
Expected pain score	5 (3, 7)	5 (3, 8)	4 (3, 6)*	5 (3, 8)	5 (3, 7)
Observed pain score in PACU	2 (0, 7)	3 (0, 7)	2 (0, 7)	0 (0, 7)	3 (0, 7)
Observed pain score at 4 hours postoperatively	5 (2, 8)	6 (2, 8)	5 (2, 7.5)	6 (2, 9)	5 (2, 7)
Observed pain score at 24 hours postoperatively	3 (1, 5.8)	4 (2, 6)	3 (0, 5)*	4 (2, 6)	3 (0, 5)*
Maximum observed pain score in 24-hour period	8 (5, 10)	9 (6, 10)	8 (5, 10)*	9 (6, 10)	8 (5, 10)

IQR: interquartile range; PACU: Post-Anaesthesia Care Unit.

*Statistically significant by Mann-Whitney U test.

Table 2. Distribution of HADS scores, expected pain scores and maximum observed pain scores among the major surgical specialties.

Specialty	HADS anxiety, median (IQR)	HADS depression, median (IQR)	Expected pain score (preoperative), median (IQR)	Maximum observed pain score (within 24 hours postoperatively), median (IQR)
General surgery (n=92)	7 (4, 10)	4 (2, 7)	5 (3, 8)	8 (4, 9)
Orthopaedics (n=79)	8 (4, 11)	6 (3, 11)	5 (3, 7)	9 (6, 10)
Gynaecology (n=77)	6 (4, 8.5)	3 (1, 6)	6 (4, 7)	8 (6, 10)
Urology (n=47)	5 (3, 9)	4 (2, 7)	4 (3, 5)	6 (4, 10)

HADS: Hospital Anxiety Depression Scale; IQR: interquartile range.

pain'. In all, 70% of patients with anxiety experienced severe pain, compared to 60% without anxiety.

Table 1 shows the comparison of expected and observed pain scores in patients with and without anxiety and depression. The presence of anxiety significantly impacted the expected pain score, observed pain score at 24 hours and the maximum pain score by non-parametric analyses. However, the presence of depression impacted only the observed pain score at 24 hours. Table 2 shows the descriptive analyses for the various pain scores according to each specialty. Kruskal-Wallis analyses comparing these scores did not show any statistically significant differences between the specialties.

A bivariate analysis (Spearman's rho) was done to assess the relationships between maximum observed pain scores and age, HADS anxiety and depression scores. A multivariate linear regression analysis was then performed to determine the associations of the maximum observed pain scores with predictor variables, including demographic factors such as gender, patient education, ethnicity and clinical factors such as presence of preoperative pain and surgical duration. The results are shown in Table 3.

A collinearity diagnostics test showed only one eigenvalue close to zero, implying that the predictors

were not highly intercorrelated. Also, the overall variances for the variables ranged from 8.2 to 16.5, implying the data were not too scattered.

The pain scores were further tested within socio-demographic and clinical categories by non-parametric analyses applying Mann-Whitney U test (for two groups) and Kruskal-Wallis analysis (for more than two groups), which showed similar results.

HADS anxiety score, HADS depression score and the preoperative expected pain score were significantly associated with the maximum observed pain score.

Patients with professional education had lower maximum observed pain scores compared to those with other levels of education. Other demographic factors such as age, gender and ethnicity did not have any significant impact on the maximum observed pain scores. Clinical factors which significantly influenced postoperative pain scores included the presence of preoperative pain and prolonged surgical duration.

Discussion

The salient finding of the study is that the preoperative psychological status may significantly impact the experience of postoperative pain in elective surgical patients.

Table 3. Associations of demographic and clinical factors with observed pain scores.

Predictor variable	Dependent variable		Spearman's rho coefficient	p-value
Age	Observed maximum pain score		-0.034	0.538
HADS anxiety score	Observed maximum pain score		0.184	0.001
HADS depression score	Observed maximum pain score		0.219	<0.001
Expected pain score	Observed maximum pain score		0.277	<0.001
Predictor variable	Categories	Observed maximum pain score, median (IQR)	Beta coefficient	p-value
Gender	Male	8 (6, 10)	0.070	0.220
	Female	8 (5, 10)		
Education	None	10	0.198	0.020
	Primary	8 (5, 10)		
	Secondary	8 (6, 10)		
	University	9 (6, 10)		
	Professional	6 (5, 9)		
Ethnicity	Afro-Trinidadians	8 (6, 10)	0.104	0.355
	Indo-Trinidadians	8 (6, 10)		
	Mixed ethnicity	8 (4, 10)		
Preoperative pain	Pain absent	8 (5, 10)	0.164	0.004
	Pain present	9 (6, 10)		
Surgical duration	<1 hour	7 (4, 9)	0.243	<0.001
	1-3 hours	9 (6, 10)		
	>3 hours	10 (8, 10)		

HADS: Hospital Anxiety Depression Scale; IQR: interquartile range.

In this study, older patients had lower HADS anxiety scores as well as expected pain scores. The inverse relationship of age in the perception of postoperative pain has been reported in many studies, higher pain scores being associated with a younger age.^{3,7,25} This may possibly be attributed to the attitudes towards surgery, with easier acceptance of its reality as well as the probable prior exposure to the healthcare system in general. However, the age of the patients did not have any influence on the HADS depression scores as well as observed pain scores in this study, similar to a previous report by Soler et al.²⁶

Also, other demographic factors such as gender and ethnicity of the patients did not influence the observed pain scores (Table 3), similar to several published previous reports.^{3–8,26} In a study by Svensson et al.,²⁵ female patients were found to have more overall pain experience and dissatisfaction with pain management programmes.

Another notable finding of the study is that the preoperative 'expected' pain scores of the patients had a strong association with their 'observed' postoperative pain scores. Many other studies have also shown the importance of patients' expectations of pain with regard to postoperative pain, relating not only to the actual pain scores but also to patient satisfaction with pain management modalities.^{25,27} In the preoperative assessment of patients, discussion regarding their

expectations of pain is not commonly undertaken in our setting, although analgesic plans may be disclosed to patients. It is worthwhile to explore this avenue of discourse with patients given its relevance to the postoperative pain scores as it can serve to allay the patients' fears about surgery and pain as well as influence their pain expectations.

Other factors that clearly impacted the observed postoperative pain score in this study included the presence of preoperative anxiety, surgical duration and the presence of preoperative pain. Given the finding that more than 64% of the study subjects experienced severe pain (pain scores: 7–10) during the first 24 hours following surgery, it is important that the anaesthetists identify the potential risk factors in the preoperative period and address the modifiable factors where possible.

Patients with preoperative pain had higher HADS anxiety and depression scores in this study. Interestingly, although this did not directly impact the 'expected' pain score, it did influence the 'observed' pain score. This is possibly because the patients might have been optimistic that the problem causing their pain may be solved following surgery.

Similar to a previous report, in this study also gynaecological surgery and prolonged surgical duration were associated with higher pain scores.²⁶

Educational level of patients influenced both the expected and observed maximum pain scores in this

study. Another previous report has suggested patient educational level to be one of the factors that can be used to predict postoperative outcome measures.²⁸

The prevalence of anxiety and depression in this study (43% and 27%, respectively) is higher compared to the reported prevalence in the general population of the Caribbean. One reason can be that patients with borderline abnormality scores (8–10) were included in this study as having anxiety and depression, which would have inflated the overall prevalence. A recent study from Jamaica reported a general prevalence of anxiety to be around 19% and depression to be 30% in patients attending clinics.²⁹ The prevalence of these conditions in this study is also much higher than a previous report on radical prostatectomy patients (25% and 12%, respectively).³ Additionally, this report found only depression to be associated with intense postoperative pain, while in this study, both anxiety and depression were associated with increased postoperative pain.³ This finding is similar to another report on breast cancer patients, where both anxiety and depression were associated with higher pain intensity and analgesic requirements.⁷

A recent review article involving around 30,000 patients undergoing total knee arthroplasty concluded mental health as an important predictor of persistent post-surgical pain.³⁰

There have been other reports which point out that emotional distress and mood disorders may significantly impact postoperative pain, which is the finding of this study.^{31–33}

The suggested mechanisms by which emotional factors influence pain perception include alterations in brain neuroplasticity, involvement of default mode network of neurones and also probable genetic predisposition.^{34,35}

With a high prevalence of anxiety and depression in this study as well as their significant influences on postoperative pain, it may be worthwhile evaluating patients for these mood disorders during their preoperative assessment. Interventions may then be used, where possible, to address these disorders, with the aim of decreasing postoperative pain. These assessments should be done formally using tools such as the HADS questionnaire or any other similar and relevant screening tools.

This study is not without limitations. The HADS to assess the patient's preoperative mood, in its original use, was used as a self-administered questionnaire. In this study, the questionnaire was administered by the investigator to allow increased patient participation in the study. Another concern with the HADS was the jargon utilised in the questions and responses. Patients with difficulty in interpreting some of the questions such as the use of the

words 'tense' or 'wound up' might have influenced responses. However, administration by a single investigator addressed this limitation by way of explanations of the question in order to get uniform responses. 'Pain catastrophizing' is another patient characteristic tested preoperatively and found to be a predictor of postoperative pain,³⁶ which was not tested in this study. Also, only short-term pain measurements were done and the long-term effects were not followed up.

Nevertheless, this study showed that modifiable factors including the patient's preoperative expected pain, presence of preoperative pain and the probable or possible presence of a mood disorder can impact postoperative pain experience. The use of patient screening, counselling, as well as appropriate preoperative treatment of the underlying mood disorder may be valuable in reducing the intensity of postoperative pain. The role of the anaesthetist is invaluable in the preoperative assessment and in addressing the concerns of the patient as well as allaying their fears. Patients identified as being at risk for experiencing increased postoperative pain should have a well-designed multimodal analgesic plan implemented in the perioperative period in order to enhance the patient's surgical and anaesthetic experience.

Declaration of conflicting interests

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