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Original Research Article

PREOPERATIVE ANXIETY AND ITS EFFECTS ON SPINAL ANAESTHESIA CHARACTERISTICS: A PROSPECTIVE STUDY

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ABSTRACT

Background: Pre-operative anxiety is a frequently encountered clinical challenge that can lead to multi-systemic neuro hormonal stress responses and potentially alter anaesthetic requirements. This prospective observational study aimed to investigate the relationship between pre-operative anxiety levels and the onset and duration of spinal anaesthesia in patients undergoing elective specialized surgeries. **Materials and Methods:** A total of 102 adult patients (ASA grade I and II) posted for elective Percutaneous Nephrolithotomy (PCNL), Total Abdominal Hysterectomy (TAH), or Vaginal Hysterectomy (VH) under spinal anaesthesia were included. Pre-operative anxiety was assessed one day prior to surgery using the Hamilton Anxiety Rating Scale and classified into mild, moderate, or severe categories. Spinal anaesthesia was standardized using 3.5 ml of 0.5% hyperbaric bupivacaine. Key clinical markers monitored included the time taken to achieve a sensory block at the T6 level, time to attain a Modified Bromage Scale (MBS) motor score of 1, and the subsequent recession times to T10 (sensory) and MBS score 6 (motor). **Result:** According to the Hamilton scale, 68.63% of patients experienced mild anxiety, 30.39% moderate anxiety, and 0.98% severe anxiety. No statistically significant association was found between anxiety levels and gender ($p = 0.1373$) or age groups ($p = 0.070$). Onset: Patients with moderate-to-severe anxiety experienced a significantly delayed onset of action compared to those with mild anxiety. The mean time to reach the T6 sensory level was 14.72 minutes versus 8.37 minutes ($p < 0.001$), and the mean time to reach an MBS score of 1 was 6.81 minutes versus 4.90 minutes ($p = 0.0081$). Duration: There was no statistically significant difference between anxiety levels and the duration of the block, measured via T10 sensory recession ($p = 0.2030$) and MBS score 6 motor recovery ($p = 0.2095$). **Conclusion:** High pre-operative anxiety is significantly correlated with a delayed onset of both sensory and motor blockade during spinal anaesthesia, though it does not impact the total duration of the block. This delay may stem from heightened conscious awareness of unblocked pathways or an increased physiological requirement for anaesthetics in anxious individuals. The findings highlight the importance of comprehensive pre-operative counseling and psychological preparation to optimize the onset characteristics of regional anaesthesia.

INTRODUCTION

Surgical procedures are significant stressors that can induce anxiety, and any preoperative medical intervention may also exacerbate this anxiety.[1-3] Hospital anxiety is frequently observed, affecting 60%–80% of individuals undergoing surgery.[4,5] Preoperative anxiety can arise from various factors, including the dread of mortality associated with anaesthesia or the surgical process, as well as apprehension regarding preoperative or postoperative discomfort.[6] Research indicates that elevated preoperative anxiety correlates with heightened intra-operative awareness, postoperative problems, prolonged hospitalization, and diminished patient

satisfaction.[7,8] Preoperative anxiety fluctuates based on the patient's age, gender, educational background, history of prior surgeries, medical condition, as well as the nature of the surgery and anaesthetic employed.[6-8] Previous research has shown that the preoperative anxiety levels in patients diminished when they were provided with sufficient information, including visual materials, prior to surgery.[9,10]

Anxiety may enhance the need for anaesthetics.[11] High anxiety level predicts increased intra operative anaesthesia requirements.[12] So, administering spinal anaesthesia with standard doses as of normal patients will take longer time required to achieve desired level of anaesthesia and less duration of action making the patients furthermore anxious. It has been reported that higher number of medical complications develops in patients with high preoperative anxiety.[13,14] Reducing anxiety during elective surgery will reduce complication by reducing neurohormonal response to surgery.[15]

Spinal anaesthesia is a secure, cost-effective, dependable, and efficient technique for administering regional anaesthesia, particularly for caesarean sections and lower abdominal surgeries.[16,17] Epidural anaesthesia, although commonly employed, is more expensive and necessitates greater technical expertise than spinal anaesthesia. Consequently, spinal anaesthesia is optimally appropriate for application in PCNL (Percutaneous nephrolithotomy), Total Abdominal Hysterectomy (TAH), and Vaginal Hysterectomy (VH). Spinal anaesthesia has additional advantages, including the maintenance of spontaneous respiratory effort, avoidance of needless airway interventions, and a decreased risk of problems related to general anaesthesia, such as aspiration pneumonia.[18] This study examined the impact of pre-operative anxiety on the onset and duration of spinal anaesthesia in patients undergoing surgery for PCNL, TAH, and VH.

Aim and objectives

The primary objectives were to assess the relationship between pre-operative anxiety with onset and duration of spinal anaesthesia and secondary objectives includes to find the distribution of the level of anxiety among the study subjects, to find the significance between level of anxiety with age groups of study subjects and to find the significance between level of anxiety with gender of study subjects.

MATERIALS AND METHODS

Study design: A prospective observational study involving 102 patients undergoing spinal anaesthesia for PCNL, total abdominal hysterectomy and vaginal hysterectomy.

Patients in the age group of 18-65 years, belonging to ASA grade I and II and patients undergoing elective surgery under spinal anaesthesia for PCNL, total abdominal hysterectomy, vaginal hysterectomy were included. Patients who refused to participate, those requiring emergency surgical procedure, belonging to ASA grade III & IV, who are pregnant, who have a failed block and who have contraindications for spinal anaesthesia were excluded from the study

Institutional Ethics Committee clearance was obtained and patients who are posted for elective surgeries under spinal anesthesia in gynecology OT and urology OT for surgeries of PCNL, total abdominal hysterectomy and vaginal hysterectomy were selected for this study. One day prior to surgery, informed consent was taken for their participation in this study and assessment of anxiety of these patients was done by using Hamilton anxiety rating scale and categorised into mild, moderate and severe anxiety

On the day of operation, the spinal anaesthesia process was elucidated to the patients, and their informed agreement was secured for the execution of the subarachnoid block. The processes of the study were elucidated to them. Standard monitoring, including ECG, pulse oximeter, and non-invasive blood pressure monitor, was connected. The baseline pulse rate, blood pressure, and respiration rate were documented. IV cannulation was performed use a 20G/18G cannula on the non-dominant hand, and a balanced salt solution was initiated. Intravenous administration of ondansetron at a dosage of 0.1 mg/kg was performed as pre-medication.

Patients were made to sit in sitting position, with all aseptic precautions, painting and draping was done. Inter vertebral spaces were palpated and a suitable , L3-L4 or L4-L5 lumbar inter space was selected. In that space, local anaesthesia was given with 3ml of inj. 2% lignocaine. Spinal anaesthesia was given by median approach either by 23G/ 25G. Quincke's tip spinal needle with 3.5ml of 0.5% hyperbaric bupivacaine. After free flow of CSF (cerebrospinal fluid) and negative aspirate of blood drug was injected. Whether patient experienced pain during the insertion of spinal needle after local anaesthesia was noted and procedural time taken from the first time insertion of spinal needle till administration of drug was also noted.

Following induction, the patient was positioned supine. The sensory level of the spinal block was evaluated using ether to assess cold sensation. The T6 level for the loss of pinprick sensation has been established and prioritized prior to permitting surgery in the study. The duration required to get T6 level was recorded. The motor level of blockade was evaluated using the Modified Bromage Scale.[19] The duration required to achieve an MBS score of 1 was recorded. If the desired level was not attained within 10 minutes, a head-down tilt was administered to enhance block height. After completion of surgery, time taken for T10 recession was noted. Time taken for attaining MBS6 was noted. After the procedure patient was shifted to recovery room for observation, and then shifted to ward.

Data from the case record form was entered in a Microsoft excel sheet. Data was gathered, organized, and analyzed utilizing EPI Info (version 7.2), a free

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public domain software developed by the Centers for Disease Control and Prevention for data analysis. The qualitative factors were represented as percentages. The quantitative variables were classified and represented as percentages or as mean and standard deviation. The disparity between two proportions was examined with the chi-square test or Fisher's exact test. All analyses were two-tailed, with the significance level established at 0.05.

RESULTS

The current study had 102 participants. The average age of the study participants was 51.13 years, with a range from 18 to 80 years. The majority of participants in the study were aged between 40 and 60 years. In this study, 50.98% of participants were male and 49.02% were female. The average weight of the study participants was 58.94±7.12 kg, and the average height was 164.30±4.71 cm in this study. In this study, 68.63% of cases exhibited mild anxiety, 30.39% demonstrated moderate anxiety, and 0.98% had severe anxiety according to the Hamilton scale.

Among the females, 60% had mild anxiety, 38% had moderate and 2% had severe; among the males, 78.92% had mild anxiety, 23.06% had moderate and none had severe anxiety. There was no significant difference (p value =0.1373) between the anxiety levels among gender by using chi square test. [Table 1]

There was no significant association (p value=0.070) between the different age groups and severity of anxiety in the present study by using chi square test. [Figure 1]

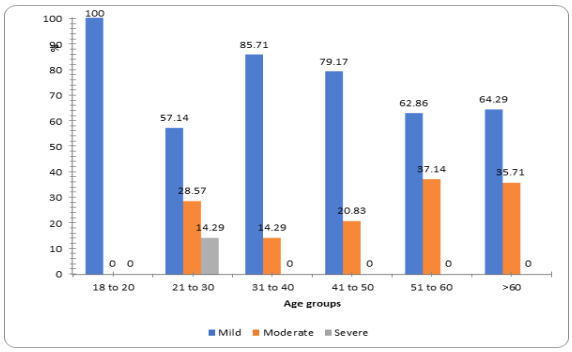

Figure 1: Distribution of patients based on the level of anxiety among different age groups.

Table 1: Distribution based on the level of anxiety among different gender

Level of anxiety	Females		Males		P value
	No. of patients	Percentage	No. of patients	percentage	
Mild	30	60.00	40	78.92	0.1373
Moderate	19	38.00	12	23.06	
Severe	1	2.00	0	0	
Total	50	100.00	52	100.00	

Table 2: Association of time taken to attain T6 level with level of anxiety

Time taken to attain T6level (mins)	Mild anxiety		Moderate to severe anxiety		P value
	Mean(mins)	SD (mins)	Mean(mins)	SD (mins)	
	8.37	2.46	14.72	7.81	<0.001

The mean time taken to attain T6 level among mild anxiety patients was 8.37mins and among moderate to severe anxiety patients was 14.72 mins and this difference was statistically significant (p value<0.001) by using independent t test. Moderate and severe anxiety patients are taken as single group and compared with mild anxiety group as there was only one patient in severe anxiety group for which standard deviation cannot be obtained. [Table 2]

Table 3: Association of time taken for receding to T10level with level of anxiety

Time taken for receding to T10 level(hrs)	Mild anxiety		Moderate to severe anxiety		P value
	Mean(hrs)	SD (hrs)	Mean(hrs)	SD (hrs)	
	2.21	0.23	2.14	0.30	0.2030

The mean time taken for receding toT10 level among mild anxiety patients was 2.21hrs and among moderate to severe anxiety patients was 2.14hrs and this difference was not statistically significant (p value=0.2030) by using independent t test. [Table 3]

Table 4: Association of time taken to attain MBS of score 1 (mins) with level of anxiety

Time taken to attain MBS of score 1 (mins)	Mild anxiety		Moderate to severe Anxiety		P value
	Mean(mins)	SD (mins)	Mean(mins)	SD(mins)	
	4.90	1.83	6.81	5.29	0.0081

The mean time taken to attain MBS of score 1 among mild anxiety patients was 4.90 (mins) and among moderate to severe anxiety patients was 6.81(mins) and this difference was statistically significant (pvalue 0.0081) by using independent t test. [Table 4]

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Table 5: Association of time taken for receding toMBS score 6 with level of anxiety

Time taken for receding to MBS score 6 with level of anxiety(hrs)	Mild anxiety		Moderate to severe anxiety		P value
	Mean (hrs)	SD (hrs)	Mean (hrs)	SD(hrs)	
	2.61	0.32	2.52	0.29	0.2095

The mean time taken for receding to MBS score 6 among mild anxiety patients was 2.61hrs and among moderate to severe anxiety patients was 2.52 hrs and this difference was not statistically significant (p value=0.2095) by using independent t test. [Table 5]

DISCUSSION

Concerns regarding anaesthesia and surgery during the preoperative phase induce anxiety. Although not life-threatening, there is significant perioperative worry and stress. Alongside apprehensions regarding separation from home and family, and disruption of daily routines, there are also worries about potential complications during or post-surgery, insufficient information regarding anaesthesia and surgical procedures, anxiety about the possibility of not regaining consciousness post-operation, and concerns about pain experienced during and after the surgery. Concerns regarding the loss of functionality, the likelihood of bodily harm, and the fear of mortality affect the intensity of anxiety experienced by the individual. Certain patients fear experiencing pain due to insufficient anaesthesia. Comparable anxiety is observed in patients undergoing elective surgery with spinal anaesthesia.

In this study, approximately 68.63% of cases exhibited mild anxiety, 30.39% shown moderate anxiety, and 0.98% presented severe anxiety according to the Hamilton Anxiety Rating Scale. Henokmulugeta et al. demonstrated that the prevalence of preoperative anxiety in their study was 61% (95% CI: 55.5–65.7), indicating that the majority of patients awaiting elective surgery experienced significant preoperative worry.[20] Jafar et al. conducted a study among surgical patients, revealing an overall prevalence of preoperative anxiety at 62%.[21] Saini et al. conducted a study on surgical patients, revealing an overall prevalence of preoperative anxiety at 58.9%.[22] Asres Bedaso et al. demonstrated that the prevalence of pre-operative anxiety in a study involving 402 patients was 47%.[23]

Our investigation found no significant correlation between age groups and anxiety severity (p value: <0.0701). This is attributable to the inclusion of patients undergoing total abdominal hysterectomy and vaginal hysterectomy, aged between 50 and 65 years. Literature presents conflicting data regarding the correlation between age and preoperative anxiety levels. Shevde and Panagopoulos indicated that anxiety levels were diminished in older individuals.[23] Ramsey et al. discovered that anxiety levels were elevated in middle-aged patients, attributing this finding to their heightened sense of familial obligation.[25] Aykent et al. indicated that anxiety levels were elevated in the patient group under 30 years of age.[26] The investigations by Turhan et al. and Jennings et al. failed to demonstrate the impact of age on anxiety.[27,28] The age range of our patients spanned from 18 to 65 years. Likewise, our study revealed no substantial correlation between age and preoperative anxiety levels.

This study revealed no significant difference (p value = 0.1373) in anxiety levels between genders, as determined by the chi-square test. Kiyohara LY et al. demonstrated that there is no correlation between gender and pre-operative anxiety.[29] Kain ZN et al. demonstrated that anxiety levels were elevated in women compared to males, in younger individuals compared to the elderly, and in patients with inadequate anaesthesia experience compared to those with satisfactory anaesthesia experience.[30] The research by Erdem et al. revealed that the average anxiety score was markedly elevated in females compared to males.[31] Badner et al. ascribed this disparity to elevated anxiety levels in women resulting from separation from their families.[32] This phenomenon has been ascribed to the variable concentrations of oestrogen and progesterone in females. This disparity may also be ascribed to the variance between men and women in acknowledging their worry, rather than variations in their intrinsic levels of anxiety.[33]

Patient characteristics, including height and weight, have been recorded to affect the degree of regional anaesthesia.[34] Gupta et al. compared the characteristics of spinal block using height and weight-based dosing versus fixed dosing of intrathecal bupivacaine for elective caesarean sections.[35] Two groupings existed. The Fixed Dose group (FD group) received an intrathecal injection of 2 ml of 0.5% hyperbaric bupivacaine (10 mg) along with 0.2 ml of fentanyl (10 mcg). The Adjusted Dose group (AD Group) received intrathecal injections based on height and weight, utilising Harten's chart, comprising 0.5% hyperbaric bupivacaine and 0.2 ml of fentanyl (10 mcg). No statistically significant difference was observed between the two groups regarding the onset of spinal anaesthesia to the target level of T5. The occurrence of hypotension and the necessity for vasoconstrictor (ephedrine) were lower in the dose-adjusted group compared to the fixed-dose group.

The study by Harten et al and Subedi A et al. indicated that the delayed start time to achieve the target level of T5 with modified dosing, as opposed to fixed dosing, may be attributed to the administration of greater doses of bupivacaine in the fixed dosage cohort.[36,37] The average weight of the study participants was 58.94±7.12 kg, and the average height was 164.30±4.71 cm. No notable difference in height was observed between patients, and a standard dose of 3.5 ml of 0.5% hyperbaric bupivacaine was administered.

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Despite the association between psychological factors and pain, inconsistent findings have been reported. Certain studies have indicated a positive correlation between both state and trait anxieties with intraoperative and postoperative pain, while others have found a positive correlation solely between state anxiety and intraoperative and postoperative pain. Anxiety correlates with a diminished pain threshold, an exaggerated perception of pain intensity, and the activation of the entorhinal cortex within the hippocampal formation. Conversely, another study found no significant association between anxiety and postoperative pain. The inconsistencies may arise from variations in questionnaires, surgical kinds, and sample sizes. Liddle C et al. demonstrated that patient anxiety is alleviated in well-prepared individuals during the preoperative period, particularly in environments that ensure patient safety and when surgical procedures are communicated in an understandable manner, even if comprehension is hindered by age or cognitive capacity.[38]

This investigation revealed a strong association between anxiety and the onset of spinal anaesthesia (p value < 0.001). A study conducted by Ciccozzi et al. demonstrated a substantial association between preoperative anxiety levels and pain and painkiller use during spinal anaesthesia.[39] Anxiety constitutes a psychological component of surgical stress. This may result in various physical consequences, including heightened sympatho-adrenal medullary activity. The stress response is multisystemic and entails the activation of neuroendocrine and metabolic systems. The degree of the perioperative stress reaction is directly proportional to the scale of the surgery. They discovered that mitigating the preoperative stress response with psychological therapies and sedatives led to enhanced postoperative behaviour, clinical recovery, and superior pain management.[40] Preoperative instructions have been shown to reduce patients' anxiety, postoperative pain, and duration of hospitalization.[41]

P.D.W. Fettes et al. showed a favourable correlation between pre-operative anxiety and the initiation of spinal action. The findings indicated that increased patient anxiety correlates with a higher likelihood of failure to manage the situation and asserting that the anaesthetic was ineffective.[42] A correctly administered spinal anaesthetic will yield total somatic and significant autonomic nerve blockade in the lower body. The unaffected regions of the nervous system necessitate attention and oversight. This pertains to conscious awareness of the clinical environment and sensations conveyed through unimpeded nerves, leading the patient to assert that the block has not yet been achieved.

Being supine and fully conscious during surgery is an unpleasant experience, even for most folks, and anxiety can exacerbate the challenges faced. Moreover, operating tables are engineered for surgical accessibility rather than patient comfort; additionally, intra-abdominal stimuli may elicit afferent signals in unblocked nerve fibres. Effective preoperative counselling of patients, coupled with a supportive demeanour from the anaesthesiologist during surgery, is crucial in preventing such issues. The use of systemic sedative and analgesic medications is also permissible. Occasionally, sedation in minimal dosages may prove beneficial. It is nearly imperative to explicitly assess the level of block prior to the initiation of operation. An overemphasis on assessing sensory and motor blockade levels may yield detrimental effects. The majority of patients will experience concern regarding the efficacy of the injection, which will be exacerbated if testing is initiated promptly and conducted at frequent intervals. The standard procedure involves assessing motor block by evaluating the capacity to elevate the legs, subsequently followed by an examination of sensory block in response to stimuli such as soft touch, cold, or pinprick. It is recommended to initiate testing in the lower segments, where onset will occur most rapidly, and subsequently go upwards.

Regardless of whether the requisite level of block has been achieved, the clinician must be assured that a sufficient block has been established. A discreet application of toothed forceps to the region of the anticipated surgical incision may serve as a more reliable indicator of skin analgesia and can provide reassurance if the block has a delayed onset. When the patient is conscious, it is preferable for the surgeon to verify using toothed surgical forceps before to incising the skin, without notifying the patient. In this scenario, the patient is preoccupied, and a mere exchange of glances between the surgeon and anaesthesiologist suffices to initiate the procedure.

This study aimed to investigate the correlation between pre-operative anxiety levels and the duration of spinal anaesthesia. No statistical significance was seen between pre-operative anxiety and the duration of spinal anaesthesia (p value = 0.2095). A composed and at-ease patient is more inclined to adopt and sustain the appropriate position; hence, elucidation is essential prior to and throughout the treatment. Careful management of patients is essential. Mild anxiolytic premedication might induce relaxation in the patient. The infusion of local anaesthetic at the puncture site is effective while preserving the anatomical landmarks and must encompass both intradermal and subcutaneous injections. Attaining the appropriate position poses a distinct challenge for patients experiencing pain, particularly in the case of a fractured hip. Systemic analgesia significantly alleviates those conditions. The aforementioned concerns are crucial, as even minimal movement can dislocate the needle from its intended location.

Charlton et al. demonstrated that the development of spinal anaesthesia may be protracted in certain patients; therefore, sufficient time should be permitted to achieve the desired level of blockade.[43] However, if the anticipated block has not formed after 15 minutes, interventions such as positioning the head lower must be administered.

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CONCLUSION

This investigation revealed a substantial correlation between pre-operative anxiety levels and the onset of spinal anaesthesia. This may be attributed to patients with elevated pre-operative anxiety possessing heightened awareness of their environment and sensations conveyed through unblocked nerves, potentially leading them to assert that the block has not yet been achieved. This may also be attributed to patients with elevated anxiety levels necessitating increased dosages of anaesthetic agents. The study found no significant correlation between pre-operative anxiety and the duration of spinal anaesthesia.

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