Preoperative Anxiety before Spinal Anesthesia: Does Internet-based Visual Information/Multimedia Research Decrease Anxiety and Information Desire? A Prospective Multicentered Study

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Abstract

Background: Preoperative anxiety may lead to peroperative or postoperative problems when not overcome. Aims: The aim of this study was to examine the effect of seeking information and other factors on the anxiety of patients preoperatively. Settings and Design: This study was a prospective, multicentered survey. Materials and Methods: Patients scheduled to undergo surgical procedures under spinal anesthesia, preoperatively evaluated as the American Society of Anesthesia 1–3 and where spinal anesthesia was agreed on beforehand, were included. Patients completed State-Trait Anxiety Inventory Scale-State (STAI-S) survey preoperatively. Patients who sought information were also asked to complete the Amsterdam Preoperative Anxiety and Information Scale survey. Statistical Analysis: Quantitative data were compared with one-way ANOVA with post hoc analysis or Kruskal–Wallis test. Comparison of two groups of parameters showing normal distribution was compared using Student’s t-test. Comparison of groups versus anxiety was performed using Chi-square and Fisher’s exact tests. Results: A total of 330 patients were included. Average STAI-S scores were similar when evaluated for patients’ demographic data, gender, marital status, place of residence, type of operation, preoperative fasting time, and comorbidities. University graduates were found to have lower anxiety when compared to other educational statuses. Seeking information from the internet caused a significant decrease in surgical anxiety ($P < 0.05$) although it had no effect on anesthesia-related anxiety. Interestingly, those seeking information had higher information desire levels compared to patients who had not sought other sources of information ($P < 0.05$). Conclusion: While patients seeking information regarding surgical procedure and/or spinal anesthesia have lower preoperative anxiety levels, their information desire remains high. Apart from detailed information given by the anesthesiologist or surgeon, having access to correct and validated information in multimedia form may decrease anxiety and information desire.

Keywords: Anxiety, information, internet, preoperative

There are many causes of preoperative anxiety including fear of death due to anesthesia or surgical procedure and fear of...
peroperative or postoperative pain. Studies have shown that high preoperative anxiety levels are associated with increased peroperative (i.e., awareness) and postoperative complications, increased hospitalization, and lower patient satisfaction. Preoperative anxiety varies according to the patient’s age, gender, educational status, history of previous operations, and medical status as well as the type of surgery and type of anesthesia.

In several former studies it was demonstrated that preoperative anxiety level of patients decreased when they were informed by using visual materials before the operations. In this multicentered prospective study, we compared anxiety levels between patients who accessed preoperative anesthesia and/or surgical visual or multimedia information and those who did not and evaluated the factors affecting preoperative anxiety.

**Materials and Methods**

This prospective study was performed after the Ethical Committee approval, and written informed consent was obtained from all participants. One education and research hospital plus three state hospitals from three separate regions participated in the study which took place between January 2015 and February 2015. Patients scheduled for minor surgery, who had been informed and accepted spinal anesthesia and who were the American Society of Anesthesia (ASA) 1–3, were included in this study. Patients who were pregnant or nursing, those undergoing treatment for psychiatric disorders, or patients who could not or refused to give informed consent were excluded from the study. A total of 330 patients were recruited with each center participating equally.

Patients were admitted to the operating room and were queried for age, gender, smoking status, vocation, place of residence, medical history, use of medication, marital status, fasting time, and surgical history. Patients were asked if they had a source of information regarding spinal anesthesia or surgical procedure other than from their surgeon or anesthesiologist. Even if patients had undergone previous surgical procedures, other sources of information were noted if such a source (internet, health worker, etc.) existed before the current surgery. Thereafter, all patients were asked to complete the validated Turkish form of Spielberger’s State-Trait Anxiety Inventory Scale-State (STAI-S). This inventory includes twenty questions that determine the momentary anxiety status. Patients are asked to answer each question as “Not at all” (1 point), “Somewhat” (2 points), “Moderately so” (3 points), “Very much so” (4 points). Total points of questions relating to negative emotions (3, 4, 6, 7, 9, 12, 13, 14, 17, and 18) are subtracted from the total points of questions relating to positive emotions (1, 2, 5, 8, 10, 11, 15, 16, 19, and 20) and then fifty is added to make the inventory score. The range of possible scores is 20–80. Patients with a score of 45 or above are accepted as having high anxiety. In addition, the following groups of patients were also asked to complete the validated Turkish version of the Amsterdam Preoperative Anxiety and Information Scale (APAIS): all patients who acquired additional information from internet (such as audiovisual or text), patients who acquired additional information from other sources except previous experience and gave a positive answer to use and access of internet [Figure 1]. Patients’ STAI scores are reported as average and by grouping patients as having mild (<46), moderate (40–45), or severe anxiety (>46).

APAIS was used as it is the only scale to measure patients’ information desire. APAIS contains two questions each regarding anesthesia, surgery, and information desire. Each question has a possible score of 1–5. Sum-A – The addition of scores for Questions 1 and 2, gives information regarding anxiety of anesthesia, Sum-S – The addition of scores for Questions 4 and 5, gives information regarding anxiety of surgery, Sum-I – The addition of scores for Questions 3 and 6, gives information regarding information desire, and Sum-C – The addition of scores for Questions 1, 2, 4, and 5, gives information regarding combined anxiety. Both scales were completed by the patient themselves or when requested completed by the anesthesiologist who asked the questions to the patients.

**Statistical analysis**

IBM SPSS Statistics 22 (IBM SPSS, Türkiye) was used for statistical analysis. Shapiro–Wilks test was used to determine if parameters had a normal distribution. Descriptive information was presented as average, standard deviation, and frequency. Quantitative data were compared with one-way ANOVA test for data showing normal distribution and Kruskal–Wallis test for data that were not normally distributed. Where one-

![Figure 1: Study design (S: Surgery, A: Anesthesia)](image-url)
way ANOVA was statistically significant, subgroup analysis was performed using Tukey’s honestly significant difference and Tamhane’s T2 tests. Where the Kruskal–Wallis test was statistically significant, subgroup analysis was performed using the Mann–Whitney U-test. Comparison of two groups of parameters showing normal distribution was compared using Student’s t-test. Statistical significance was accepted as $P < 0.05$. Comparison of groups versus anxiety was performed using Chi-square and Fisher’s exact tests. When significant, standardized residual Z scores were calculated.

**Results**

A total of 330 patients (143 females and 187 males) with an average age of 39.89 ± 14.27 years (range, 18–72 years) were included in the study. A large majority of patients (75.5%) lived in a city. All patients were literate and most (53.3%) had an educational level of high school or higher. Smokers made up 47.3% of the population and 73.3% were married. Patients underwent surgeries in the following fields: general surgery (59.7%), gynecology (5.5%), neurosurgery (3.3%), orthopedics (25.5%), and urology (6.1%). While 72.4% of patients had no previous surgical experience, 13.9% had experience with general surgery and 13.5% with neuraxial anesthesia. Most patients had no comorbidities (77%) with an ASA score of 1. Only seven patients had ASA score of 3. Fasting times were 8–10 h in 32.1%, 11–13 h in 35.8%, and 14–16 h in 32.1% [Table 1]. All patients’ STAI-S scores are shown in Tables 1 and 2.

Sociodemographic factors: gender, residence, smoking, and marital status, and type of surgery, fasting time, comorbidity, and ASA score were found not to be associated with average anxiety [Table 1]. However, when patients were grouped as having mild, moderate, or severe anxiety, having comorbidity was associated with severe anxiety, fasting time of 8–10 h was associated with mild anxiety [Table 1].

When STAI-S anxiety scores were analyzed, university graduates had lower STAI-S scores when compared to patients who were literate or primary school graduates ($P < 0.05$; $P < 0.01$, respectively). STAI-S scores were similar between university graduates, middle school, and high school graduates. When patients were grouped as having mild, moderate, or severe anxiety, being literate was associated with severe anxiety [Table 1].

STAI-S scores were lower in patients who had experience with neuraxial anesthesia when compared to those who had no anesthesia experience and those who had general anesthesia experience ($P < 0.01$; $P < 0.01$, respectively). There was no statistically significant difference between STAI-S scores of patients who had no anesthesia experience and those who had experience with general anesthesia. However, when patients were grouped as having mild, moderate, or severe anxiety, a positive association was seen between neuraxial anesthesia and mild anxiety whereas a negative association was seen between neuraxial anesthesia and severe anxiety [Table 1].

Table 2 shows the comparison of STAI-S scores according to the source of information (other than standard information given by anesthesiologist or surgeon). When the source of information other than that routinely given by the surgeon or anesthesiologist was evaluated, most patients reported that they sought no other source (57.6%), 23.3% sought information from internet videos, 3.6% from internet text, 8.2% from personal experience, and 7.3% received information from another health-care worker. For those undergoing spinal anesthesia, information source was no source in 56.6%, internet video in 19.7%, internet text in 2.7%, personal experience in 13.4%, and other health-care workers in 7.6% [Figure 1 and Table 2]. For those seeking internet audio-visual information, 71 of 74 patients sought information on both anesthesia and surgical procedure. However, when patients were grouped as having mild, moderate, or severe anxiety, there was no statistical difference between source of surgical information versus anxiety.

When sources of information for surgery were compared, the average STAI-S scores were lower in those who sought information from the internet ($P < 0.05$). When patients were grouped as having mild, moderate, or severe anxiety, there was no statistical difference between sources of information.

When sources of information for anesthesia were compared, the average STAI-S scores for personal experience were statistically significantly lower when compared to the scores of no information and information from health-care workers ($P < 0.001$). When patients were grouped as having mild, moderate, or severe anxiety, patients with previous experience were associated with having mild anxiety.

When the anxiety levels of 71 patients who sought information from the internet regarding both surgery and anesthesia were compared to 172 other patients who completed the APAIS survey [Table 3], no statistically significant difference was observed between STAI-S and APAIS score averages according to the internet use ($P < 0.05$). While the APAIS-S and APAIS-C averages of those who sought information from the internet were significantly lower when compared to other sources ($P < 0.05$), APAIS-I of those who used internet was significantly higher when compared to other sources ($P < 0.05$). Power analysis was performed on APAIS-I data, and the two-sided power was found to be 82.9% with 95% confidence interval.

**Discussion**

In this prospective, cross-sectional, multicentered study, we evaluated the effect of sociodemographic factors and source of information on preoperative anxiety in patients who undergo surgery under spinal anesthesia. By utilizing STAI-S and APAIS scales, we found that preoperative anxiety was slightly decreased when patients sought information regarding their surgical procedure and spinal anesthesia, in addition to the routine information given by their surgeon and anesthesiologist. However, this effort to seek information did not affect the patient’s information desire.
Table 1: Patients’ demographics and comparison of State-Trait Anxiety Inventory scores

|                      | n (%)     | STAI               |           |           |           | P       |
|----------------------|-----------|--------------------|-----------|-----------|-----------|---------|
|                      |           | Mean±SD            | Mild anxiety, ≤39 (n) | Moderate anxiety, 40-45 (n) | Severe anxiety, ≤46 (n) |         |
| **Gender**           |           |                    |           |           |           |         |
| Male                 | 143 (75.5)| 43.13±2.54         | 15        | 100       | 28        | 0.1050  |
| Female               | 187 (24.5)| 42.72±2.55         | 23        | 143       | 21        |         |
| **Residence**        |           |                    |           |           |           |         |
| City                 | 249 (75.5)| 42.9±2.59          | 31        | 178       | 40        | 0.2987  |
| Rural                | 81 (24.5) | 42.89±2.44         | 7         | 65        | 9         |         |
| **Educational status**|          |                    |           |           |           |         |
| Literate             | 40 (12.1) | 43.65±2.76         | 5         | 22        | 13*       | 0.0108  |
| Primary school       | 38 (11.5) | 43.74±2.85         | 3         | 26        | 9         |         |
| Middle school        | 77 (23.3) | 42.75±2.5          | 9         | 59        | 9         |         |
| High school          | 121 (36.7)| 42.91±2.28        | 11        | 98        | 12        |         |
| University           | 54 (16.4) | 41.94±2.54         | 10        | 38        | 6         |         |
| **Smoker**           |           |                    |           |           |           |         |
| Yes                  | 156 (47.3)| 42.94±2.48         | 20        | 121       | 19        | 0.4253  |
| No                   | 174 (52.7)| 42.87±2.62         | 23        | 122       | 29        |         |
| **Marital status**   |           |                    |           |           |           |         |
| Single               | 59 (17.9) | 42.31±2.37         | 9         | 45        | 5         | 0.4733  |
| Married              | 242 (73.3)| 43±2.56            | 26        | 179       | 37        |         |
| Divorced             | 29 (8.8)  | 43.24±2.75         | 3         | 19        | 6         |         |
| **Type of surgery**  |           |                    |           |           |           |         |
| General surgery      | 197 (59.7)| 42.99±2.66         | 22        | 139       | 36        | Not calculated |
| Gynecology           | 18 (5.5)  | 43.22±3.17         | 4         | 8         | 6         |         |
| Neurosurgery         | 11 (3.3)  | 43±2.05            | 1         | 10        | 0         |         |
| Orthopedic           | 84 (25.5) | 42.73±2.28         | 8         | 70        | 6         |         |
| Urology              | 20 (6.1)  | 42.35±2.28         | 3         | 16        | 1         |         |
| **Comorbidities**    |           |                    |           |           |           |         |
| Yes                  | 76 (23.0) | 43.38±2.63         | 7         | 50        | 19*       | 0.0172  |
| No                   | 254 (77.0)| 42.76±2.51         | 31        | 193       | 30        |         |
| **Previous anesthesia experience** | | | | | | |
| None                 | 239 (72.4)| 43.23±2.38         | 20        | 181       | 38        | <0.001  |
| General              | 46 (13.9) | 43.65±2.46         | 2         | 34        | 10        |         |
| Neuraxial            | 45 (13.6) | 40.36±1.97**      | 16*       | 28        | 1*        |         |
| **ASA (median)**     |           |                    |           |           |           |         |
| 1                    | 248 (75.2)| 42.73±2.44 (43)    | 30        | 189       | 29        | 0.107   |
| 2                    | 75 (22.7) | 43.39±2.81 (44)    | 8         | 49        | 17        |         |
| 3                    | 7 (2.1)   | 43.57±2.82 (44)    | 0         | 5         | 2         |         |
| **Fasting time (h)** |           |                    |           |           |           |         |
| 8-10                 | 106 (32.1)| 42.98±2.85         | 19*       | 65        | 22        | 0.045   |
| 11-13                | 118 (35.8)| 42.54±2.5          | 13        | 94        | 11        |         |
| 14-16                | 106 (32.1)| 43.22±2.24         | 6         | 84        | 16        |         |

*Contd...*
There are several scales frequently used to determine the presence of and grade the level of anxiety. The most frequently used scales are Anxiety Inventory STAI-I and -II tests, Beck Anxiety and Depression Scale, and Hospital Anxiety and Depression scale. The STAI test is more prominent among others as it has been translated and validated in many languages. Some studies have grouped STAI scores as being having mild, moderate, or severe anxiety or low/high anxiety. Although STAI is commonly used, this grouping of anxiety levels shows a significant difference between publications and their source country.

STAI-I and -II have been previously used for anxiety studies in our country. The APAIS scale was developed in 1996 with the aim of measuring the effect of surgery and anesthesia as well as the information desire components of preoperative anxiety. Many studies prefer APAIS scale as it is easily applied although STAI-S is used as commonly. Although many local studies have used APAIS, there are several studies noting that it is not appropriate for use in the Turkish population. We used APAIS in our study as we wanted to determine the effect of information desire when patients used internet as their source of information and APAIS was, therefore, the most appropriate to use.

Many studies have evaluated the effect of sociodemographic factors such as gender, smoking status, and marital status on anxiety with controversial results. When sociodemographic data were analyzed, our study found a difference between anxiety

### Table 1: Contd...

| Source of information-related surgery | n (%) | STAI Mean±SD | Mild anxiety, ≤39 (n) | Moderate anxiety, 40-45 (n) | Severe anxiety, ≤46 (n) | P |
|---------------------------------------|-------|--------------|------------------------|---------------------------|-------------------------|---|
| None                                  | 190 (57.6) | 43.07±2.59 | 21 | 137 | 32 | 0.2721 |
| Internet                              | 99 (26.9) | 42.21±2.47 | 14 | 65 | 10 | 0.018 |
| Personal experience                   | 27 (8.2) | 43.3±2.84 | 3 | 19 | 5 | 0.0005 |
| Health-care worker                    | 24 (7.3) | 43.63±1.58 | 0 | 22 | 2 | 0.001 |

*Analyses were performed to determine which groups were different from each other. University graduates had lower STAI-S scores when compared to patients who were literate or primary school graduates (P<0.05, P<0.01). No other statistical differences were found between other groups. **STAI-S scores were lower in patients who had experience with neuraxial anesthesia when compared to those who had no anesthesia experience and those who had general anesthesia experience (P=0.001, P=0.001). aStandardized residual >±2.0. *Student’s t-test. ASA=American Society of Anesthesia, STAI-S=State-Trait Anxiety Inventory Scale-State, SD=Standard deviation

### Table 2: State-Trait Anxiety Inventory according to anesthesia and surgical information sources

| Source of information-related surgical anesthesia* | n (%) | STAI Mean±SD | Mild anxiety, ≤39 (n) | Moderate anxiety, 40-45 (n) | Severe anxiety, ≤46 (n) | P |
|---------------------------------------------------|-------|--------------|------------------------|---------------------------|-------------------------|---|
| None                                              | 187 (56.6) | 43.45±2.39 | 13 | 128 | 32 | 0.0005 |
| Internet                                          | 74 (22.4) | 42.55±2.53 | 8 | 56 | 10 | 0.001 |
| Personal experience                               | 44 (13.4) | 41.4±2.73 | 16a | 36 | 6 | 0.001 |
| Health-care worker                                | 25 (7.6) | 43.6±1.55 | 0 | 23 | 2 | 0.001 |

One-way ANOVA test. *There was no significant difference between STAI-S averages of those with personal information and those receiving information from internet (P>0.05). aStandardized residual >±2.0. STAI=State-Trait Anxiety Inventory, SD=Standard deviation, STAI-S=State-Trait Anxiety Inventory Scale-State

### Table 3: Comparison of patients receiving information from internet versus all others

| Source of information | STAI Mean±SD | APAIS-A Mean±SD | APAIS-S Mean±SD | APAIS-I Mean±SD | APAIS-C Mean±SD |
|-----------------------|--------------|------------------|----------------|----------------|-----------------|
| Internet (n=71)       | 42.6±2.44    | 6.26±1.02        | 5.82±1.19      | 6.81±0.74      | 12.08±1.76      |
| Other (n=172)         | 43.15±2.06   | 6.47±0.88        | 6.2±1.09       | 6.48±0.94      | 12.67±1.58      |

P=0.152

Student’s t-test. SD=Standard deviation, STAI=State-Trait Anxiety Inventory, APAIS=Amsterdam Preoperative Anxiety and Information Scale. The APAIS scale was developed in 1996 with the aim of measuring the effect of surgery and anesthesia as well as the information desire components of preoperative anxiety.
and educational status. No relationship was found between other sociodemographic factors (such as gender, residence, smoking, etc.) and anxiety. Two studies have previously found no relationship between anxiety and parameters such as gender, smoking status, marital status, and educational status.[2,10] However, our study found that anxiety decreased as the level of education increased. We also found that patients previously undergoing neuraxial anesthesia had less anxiety when compared to others. A study performed in Ethiopia found no relationship between anxiety and educational status although the same study found that patients who are single and those who undergo surgeries performed in the afternoon have higher levels of anxiety, possibly due to increased fasting time.[15] Our study found that neither marital status nor length of fasting affected preoperative anxiety although educational status was found to have a relationship. We believe these relationships may differ from country to country.

Our study focuses more on the effect of source of information (other than the routine information given by surgeon or anesthesiologist) on anxiety in patients undergoing spinal anesthesia for minor surgical procedures. We are unaware of any similar study published in literature. The use of mobile technologies and the internet has made access to information easier. There are thousands of sources of accessible audio-visual information online, most of which does not undergo any control for authenticity or accuracy. There are studies reporting a decrease in preoperative anxiety in patients undergoing regional or spinal anesthesia, viewing visual or audio-visual information prepared by health-care professionals.[9,10] These studies lead us to the conclusion that information routinely provided by the patient’s surgeon and anesthesiologist is insufficient. Although all patients received routine information from their surgeon and anesthesiologist, more than half of patients in our study sought information from other sources. Many patients used the internet as this source. Our study has also demonstrated that audio-visual information regarding surgical procedure or anesthesia sought from internet decrease preoperative anxiety levels. However, when patients who use the internet were evaluated using the APAIS score, patients who we found no decrease in APAIS – Sum-A, a score that shows anesthesia-related anxiety. In the same patient group, we saw a decrease in APAIS – Sum-S and APAIS – Sum-C, scores that show surgery-related and combined anxiety levels, respectively. Interestingly, patients who sought information from the internet had a higher APAIS – Sum-I score, showing that their information desire increased. This may be due to the insufficiency or lack of trust of multimedia information.

Our study has several limitations. Due to the design of our study, patients may have had many different sources of information that could affect our results. The aim of this study was not to measure the accuracy or validity of sources which patients access, but to perform an overall evaluation and measure the effect on preoperative anxiety. We also did not objectively determine how patients accessed or their skill at using the internet. We classified internet use according to the patient’s statement.

After decision for surgery, each clinic has separate procedures for preoperative preparation. While some patients may undergo surgery within a few days, this may be weeks or months in some clinics. As this time, awaiting surgery increases, patients inevitable seek information more actively, possibly leading to information pollution.

**Conclusion**

In patients who undergo surgical procedure under spinal anesthesia, we believe educational status may have an effect on patients’ preoperative anxiety levels. In addition to the information given to the patient by their own surgeon or anesthesiologist, information obtained from the internet led to a decrease in surgery-related anxiety but not anesthesia-related anxiety. However, we cannot conclude that there is a decrease in information desire. In the age where internet is commonly used, it is important to validate and control the accuracy of online information. Considering that information sought from the internet did not have any effect on information desire, surgeons and anesthesiologists must endeavor to provide sources of information that will decrease this anxiety.

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**Conflicts of interest**

There are no conflicts of interest.

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