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The effect of preoperative anxiety and depression on postoperative recovery quality

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Abstract

Despite varying according to the disease and the patient, emotional reactions such as anxiety, depression, regression, anger, and grieving responses are observed in the preoperative period. High preoperative anxiety levels can lead to increased need for postoperative pain relief, prolonged hospital stay, inadequate patient satisfaction and insufficient patient recovery.In the present study, it was aimed to measure preoperative anxiety and depression levels and to determine their relationship with quality of recovery in patients scheduled to undergo elective surgery under general anesthesia. A total of 137 patients older than 18 years of age who were planned for elective surgery and who were to be operated under general anesthesia were included in the study. In the preoperative period, the patients were asked to fill out the demographic information form, Beck anxiety inventory and Beck depression inventory. They were also asked to complete the quality of awakening and the quality of recovery questionnaires at the postoperative first day and first month.It was detected that the anxiety and depression scores were high, whereas the recovery quality was low in females. The depression scores of the patients who were college graduates were found to be low. It was observed that the quality of awakening and the quality of recovery values at the postoperative first day and first month were significantly lower in the patients with higher depression and anxiety scores. According to these results, reducing the anxiety and depression of the patients in the preoperative period to a minimum is necessary to minimize the negative effects in the postoperative period such as inadequate patient recovery, increased need for painkillers, long hospital stay and insufficient patient satisfaction.

Keywords: Beck anxiety inventory, Beck depression inventory, recovery quality, preoperative anxiety, preoperative depression

Introduction

In the preoperative period, regardless of the severity of the disease or the size of the surgery, patients may experience different affection such as fear of being dependent on others or losing their independence completely, separation anxiety, anxiety about the future, fear of death, fear of their body, organs and parts being damaged, regret, and feelings of guilt [1,2]. As a consequence of these affection, despite varying according to the disease and the patient, emotional responses including anxiety, depression, regression, anger, and grieving reactions are observed [2,3]. The most common and frequent of these responses are anxiety and depression [2].

The responses such as anxiety and depression that the individual exhibits directly influence the style and strength of coping with the disease [4]. When the stress of hospitalization emerges, and patients feel more threatened, they have difficulty in using their normal coping skills [2].

Anxiety and depression challenge individuals biologically, psychologically and socially before surgery [5,6]. Most patients preparing for elective surgery experience anxiety and depression, and this is considered to be a common response [1,2]. Anxiety and depression are unpleasant sensations that can adversely influence the patient's recovery as well as also the surgical procedure [2,7]. Anxiety during the process of surgery decision-making and waiting does not hinder the treatment in most patients.

The degree of preoperative anxiety is associated with the diagnosis,

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the organ and system involved, the degree of difficulty and risk of the surgery and the patient's prejudices concerning these [6]. Besides, the nature of the patient- surgeon relationship also plays a decisive role.

Studies in the literature demonstrate that high preoperative anxiety levels can lead to increased need for postoperative pain relief, prolonged hospital stay, inadequate patient satisfaction and insufficient patient recovery [8,9]. One of the important goals of preoperative preparation; to reduce the anxiety that negatively affects the surgery, anesthesia and post-operative recovery[10]. its most important aim is to reduce the anxiety that negatively affects the surgery, anesthesia and post-operative recovery [11,12].

In some studies, it has been shown that anxiety levels and postoperative pain of patients who were informed in detail in the preoperative period were lower and recovery was faster [12].

Survey studies are used in the determination of the level and causes of preoperative anxiety and depression, and the verification of the quality of anesthesia. These studies play an important role in terms providing information about needs, expectations and perceptions of patients. There are serious limitations in surveys to be used to determine and monitor patient satisfaction and recovery quality. Therefore, surveys need to be carefully structured, refined and standardized to become measurement elements.

The aim of the present study was to measure preoperative anxiety and depression levels and to determine their relationship with the quality of recovery in patients scheduled to undergo elective surgery under general anesthesia.

Materials and Methods

Before commencing the study, an ethical approval was obtained from the ethics committee of Gaziosmanpasa University Faculty of Medicine. The type of the study is prospective , cross-sectional , clinical, survey. It was chosen in accordance with the Helsinki declaration. The patients older than 18 years who were scheduled for elective surgery under general anesthesia at Gaziosmanpasa University Faculty of Medicine, Department of Anesthesiology between March 2013 and August 2013 were included in our study. Those who were scheduled for surgery from otorhinolaryngology, ophthalmology, plastic and reconstructive surgery, general surgery, urology, thoracic surgery, orthopedics and traumatology, neurosurgery, gynecological and obstetric surgery, who did not have a known psychiatric disease or medical problem that may cause assessment limitations were included in the study. Illiterate patients and those who did not want to participate in the study were excluded. The patients were informed about the study, and their written consent was received.

It was initially planned to include 204 patients in the study, however, among the 53 patients, the operation was postponed for some of them, some gave up the surgery. In addition, six patients rejected to fill out the questionnaire, and eight patients were not be able to be reached due to early discharge. Accordingly the study sample comprised 137 patients.

The patients were requested to fill out the questionnaire forms during the preoperative evaluation as well as in the follow-up visits at the postoperative first day and one month. The preoperative questionnaire form consists of three sections. The first section includes demographic information including age, gender, marital status, educational status and the diagnosis of surgery; the second part is the 21-item Beck anxiety inventory in which anxiety is evaluated, and the third part is the 21-item Beck depression inventory in which depression is assessed. At the postoperative first day follow-up, the patients were asked to mark a point on the visual analog scale (VAS) from poor to good for the quality of awakening. The quality of awakening was used for the aim of supporting the quality of recovery results. The patients were asked to fill out the QoR-40 questionnaire, which includes 40 questions on the quality of patient recovery at the postoperative first day and one month.

Power analysis has been done.(Efect Size: 0.381;α Err prob:0.05; Power (1-β Err prob):0.80) At least 135 patients must be included in the study. (G.Power 3.1.9.7 was used for Power Analysis)

Statistical Analysis

All statistical assessments in the study were performed with the help of the SPSS for Windows 11.0 software package (IBM-SPSS,

Chicago, IL, USA). Descriptive analyses were conducted to reveal the general characteristics of the study groups. The Kolmogorov-Smirnov test was used in evaluating the normality distribution of the continuous variables. In the comparison of continuous variables Two Sample T test or the one-way Analysis of Variance (ANOVA) was performed depending on the results obtained in the normality evaluation.

The data for continuous variables are presented as mean ± standard deviation, whereas those for categorical variables are given as n (%). The p-values less than 0.05 was considered statistically significant.

Results

Out of 137 patients who participated in the study, 73 (53.3%) were female and 64 (46.7%) were male. The mean age of the patients was 40.9 years (Range: 18-79 years); and 26 (19%) patients were single and 111 patients (81%) were married.

The distribution of the patients with respect to their education level is 71 (51.8%) patients who were literate or primary school graduate, 16 (11.7%) middle school graduates, 30 (21.9%) high school graduates, and 20 (14.6%) college graduates.

Accordingly, of the patients, 2 (1.5%) were from neurosurgery; 23 (16.8%) were from general surgery; 2 (1.5%) were from thoracic surgery; 5 (3.6%) were from eye diseases; 29 (21.2%) were from gynecology and obstetrics surgery; 21 (15.3%) were from otolaryngology; 31 (22.6%) were from orthopedics; 6 (4.4%) were from plastic surgery and 18 (13.1%) were from urology departments.

The data obtained were analyzed by gender of the patients with the Mann Whitney U test (Table 1). The mean preoperative anxiety and depression scores were respectively 9.23±8.65 and 11.08±9.14 in the females, while 6.94±6.99 and 5.95±8.35 in the males. The statistical comparison of these results indicated that the anxiety and depression scores in the females were significantly higher than in the males ($p<0.007$ and $p<0.041$, respectively). The mean awakening quality were 5.77±2.98 in the females and 6.94±2.80

in the males; and revealing that the awakening quality was significantly higher in the males (p<0.021). The mean recovery quality value at the postoperative first month was 184.18±14.01 in the females and 188.47±12.14 in the males, and it was found that the recovery quality value of the females was significantly lower (p<0.016).

Table 1. Anxiety, depression, awakening quality and recovery quality values by gender

	Female (n=73) Mean±SD	Male (n=64) Mean±SD	p-value
Beck anxiety	9.23±8.65	6.94±6.99	0.007
Beck depression	11.08±9.14	5.95±8.35	0.041
Awakening quality	5.77±2.98	6.94±2.80	0.021
Post QoR40	166.36±19.54	178.16±20.30	0.050
Post2 QoR40	184.18±14.01	188.47±12.14	0.016
Two Sample T Test			

ANOVA was used to evaluate the data gathered based on the education level of the patients. Since the Beck anxiety scores did not show a normal distribution, the Kruskal Wallis test was used in their analysis (Table 2). The mean Beck depression value was found to be 5.00±6.48 in the patients with a college degree, and 11.45±9.64 in the patients with a primary school degree or literate. Thus, it was detected that the patients with a primary school degree or literate were significantly more depressive than those with a college degree (p<0.027).

The patients who participated in the study were classified in three groups according to their age as 18-30 years old, 31-60 years old and over 61 years old. The data by the age group were assessed with ANOVA (Table 3). The anxiety was observed to be more common in the patients in the 31-60 year old group than those older than 61 (p<0.015). The patients in the 18-30 year old group had higher awakening quality values compared to the patients in the 31-60 year old group (p<0.022).

Table 2. The anxiety, depression, awakening quality and recovery quality values according to the education level of the patients

	Literate or primary school (n=71)	Middle School (n=16)	Highschool (n=30)	College (n=20)	p-value
Beck anxiety	7.45±7.26	8.00±8.76	9.53±9.78	5.60 ± 7.34	0.313
Beck depression	11.45±9.64	10.25±8.67	8.57±7.30	5.00 ± 6.48	0.027
Awakening quality	5.90±3.01	7.00±2.66	6.20±3.12	7.40 ± 2.44	0.065
Post QoR40	166.99±22.04	171.00±16.33	170.57±16.57	175.65 ± 20.21	0.505
Post2 QoR40	184.11±15.00	187.19±9.66	187.77 ± 12.13	190.35 ± 9.98	0.381
One-way Analysis of Variance (ANOVA)					

Table 3. The anxiety, depression, awakening quality and recovery quality values according to age groups

	18-30 (n=41)	31-60 (n=61)	61+(n=34)	p-value
Beck anxiety	5.84 ± 6.25	9.19 ± 8.89	3.50 ± 3.27	0.015
Beck depression	8.35 ± 9.00	10.27 ± 8.74	10.14 ± 9.46	0.541
Awakening quality	7.35 ± 2.77	5.92 ± 2.96	6.00 ± 2.80	0.022
Post QoR40	172.27 ± 19.47	168.66 ± 20.92	167.36 ± 16.91	0.607
Post2 QoR40	188.89 ± 11.27	186.27 ± 11.81	178.50 ± 22.41	0.205
One-way Analysis of Variance (ANOVA)				

The anxiety, depression, quality of awakening, and quality of recovery values at the first postoperative day and the first month are given by the surgical departments of the patients in Table 4.

The correlation between the anxiety and awakening quality was examined with the Spearman correlation test (Table 5). Based on the results of the statistical test performed, a weak (r=-0.337), negative and significant correlation was found between the anxiety scores and awakening quality of the patients (p<0.001).

Table 5. Correlation between the anxiety scores ,depression scores ,the quality of recovery at the first post-operative day, the quality of recovery at the first postoperative month and awakening quality of the patients

The Spearman correlation test was employed in the analysis of the correlation between the depression scores and awakening quality (Table 5). As can be seen from the table below, the correlation between the depression scores and awakening quality of the patients was weak (r=-0.348), negative and significant (p<0.001).

The correlation between the anxiety and quality of recovery at the first post-operative day, analyzed with the use of Spearman correlation test, was detected to be weak (r=-0.472), negative and significant (p<0.001) (Table 5). The Spearman correlation test was used to analyze the correlation between the depression scores and recovery quality at the first post-operative day (Table 5). According to the results, it was determined that there was a moderately strong (r=-0.548), negative and significant correlation between the depression scores of the patients and their recovery quality value at the first post-operative day (p<0.001).Because the correlation between the anxiety of the patients and the quality of recovery at the first postoperative month did not show a normal distribution, the Pearson correlation test was utilized (Table 5). Accordingly, the correlation between these two variables was weak (r=-0.361), negative and significant (p<0.001). The correlation between the depression scores and the quality of recovery at the first postoperative month was determined using the Pearson correlation test, since the data did not show a normal distribution (Table 5). The results indicated that there was a

moderately strong (r=-0.507), negative and significant correlation between the depression scores of the patients and the quality of recovery at the first post-operative month (p<0.001).In our study, the quality of awakening, a measure that we used for the aim of supporting the quality of recovery data, was examined with VAS scoring. The correlation between the quality of awakening and the quality of recovery at the postoperative first day was assessed using the Spearman correlation test (Table 5); and a weak (r=0.469), positive and significant correlation was detected between these two variables (p<0.001). The correlation between the quality of awakening values of the patients and their quality of recovery values at the first postoperative month, examined using the Spearman correlation test (Table 5), was found to be weak (r=0.446), positive and significant (p<0.001).

Table 4. The results by the surgical department of the patients

Department		n	Minimum	Maximum	mean ± SD
Gynecology and obstetrics	Beck anxiety	29	0	39	9.93±9.98
	Beck depression	29	0	26	10.41±8.19
	Awakening quality	29	0	10	5.52±2.97
	Post QoR40	29	143	197	166.69±17.6
	Post2 QoR40	29	172	200	186.97±9.15
Otolaryngology	Beck anxiety	21	0	24	6.90±7.14
	Beck depression	21	0	25	5.05±7.02
	Awakening quality	21	0	10	6.76±2.93
	Post QoR40	21	117	198	172.19±21.58
	Post2 QoR40	21	146	200	187.33±15.32
Plastic Surgery	Beck anxiety	6	0	35	8.17±13.43
	Beck depression	6	0	19	6.67±8.57
	Awakening quality	6	1	9	5.33±3.5
	Post QoR40	6	152	194	175.83±19.61
	Post2 QoR40	6	163	200	188.33±15.37
General Surgery	Beck anxiety	23	0	15	6.26±4.02
	Beck depression	23	0	38	13.04±10.67
	Awakening quality	23	1	10	6.35±2.99
	Post QoR40	23	129	194	165.78±20.24
	Post2 QoR40	23	117	200	183.48±18.2
Urology	Beck anxiety	18	0	12	4.22±3.63
	Beck depression	18	0	29	8.00±8.87
	Awakening quality	18	1	10	6.94±3.03
	Post QoR40	18	145	200	174.11±15.91
	post2QoR40	18	161	200	187.83±1.78
Thoracic surgery	Beck anxiety	2	15	25	20.00±7.07
	Beck depression	2	14	16	15.00±1.41
	Awakening quality	2	0	10	5.±7.07
	Post QoR40	2	174	176	175.0±1.41
	Post2 QoR40	2	176	184	180.0±5.65
Orthopedics and Traumatology	Beck anxiety	31	0	26	8.35±7.94
	Beck depression	31	0	28	11.0±8.47
	Awakening quality	31	2	10	6.48±2.51
	Post QoR40	31	113	197	167.55±22.2
	post2QoR40	31	156	200	184.61±12.54
Neurosurgery	Beck anxiety	2	1	4	2.50±2.12
	Beck depression	2	1	13	7.0±8.48
	Awakening quality	2	9	10	9.5±0.7
	Post QoR40	2	186	200	193.0±9.89
	Post2 QoR40	2	195	200	197.5±3.53
Eye Diseases	Beck anxiety	5	1	34	9.8±13.64
	Beck depression	5	0	27	11.40±10.13
	Awakening quality	5	3	10	6.0±3.31
	Post QoR40	5	111	189	168.0±32.66
	Post2 QoR40	5	165	197	188.4±3.22

Table 5. Correlation between the anxiety scores ,depression scores ,the quality of recovery at the first post-operative day, the quality of recovery at the first postoperative month and awakening quality of the patients

	Awakening quality	Post QoR40	Post2 QoR40
Beck anxiety	-0.337*	-0.472*	-0.361*
Beck depression	-0.348*	-0.548*	-0.507*
Awakening quality	-	0.469*	0.446*

Spearman's Rho Correlation Coefficents p-value is significant at level 0.05

Discussion

Surgery, from many patients' point of view, is a life event of great significance that interrupts the personal, professional and economic lives of patients, as well as its physical effects. It is seen in the literature that researchers commonly use survey based analyses to measure the quality of anesthesia in anaesthesiology research. Survey studies provide very important information in relation to needs, expectations and perceptions of patients. Since there are notable limitations in anesthesia research surveys used to evaluate and monitor the patient satisfaction and quality of anesthesia, they need to be carefully carried out and standardized. In our study, we investigated the factors affecting the quality of recovery in patients who underwent elective surgery, utilizing survey methods that had previously been proven to be valid and reliable.

Patients enter the hospital with anxiety and fear. Jawaid et al. showed that most patients waiting for elective surgery experience high preoperative anxiety [13]. The preoperative anxiety scores of 137 patients included in our study exhibited that most of the patients experienced mild anxiety.

There are a lot of risk factors associated with preoperative anxiety. In our study, the anxiety levels of females were observed to be significantly higher. While similar findings have been reported in the literature [14], some researchers have shown that gender effect is not significant [15,16]. Moerman et al. investigated the relationship between gender and anxiety in their study involving 320 patients and reported that anxiety was significantly higher in females [17]. In the study conducted by Badner et al including 96 patients, the STAI score was found to be 42.9±12.8 in women and 38.2±12.3 in men, and it was reported that this difference was statistically significant . The fact that depression and anxiety disorders are epidemiologically more common in females may also be effective in this result . Shevde and Panagopoulos and Domar et al. attributed this to females' ability to express their concerns more easily than men [18,19].

There exist conflicting results in previous studies with regard to the relationship between age and preoperative anxiety. Some researches have stated that age does not affect the level of preoperative anxiety [1,17,18]. On the other side, some studies have cited that the preoperative anxiety level is lower in patients with advanced age [18,20]. In a study in which 106 orthopedic patients were enrolled, Calvin et al. compared the preoperative anxiety levels of young, middle aged and elderly patients and found no difference [21]. Ramsay reported that the anxiety score in middle-aged patients are high and attributed this finding to the fact that the middle-aged people feel to have more responsibilities towards their families [22]. Grabow et al. found that the preoperative anxiety level is high in younger patients [23]. Similarly, Shevde et al. stated lower preoperative anxiety levels among the elderly [18]. It is considered that the fact that the elderly adopt more fatalistic perspective unlike the young, and that the young people can keep up with the communication tools more closely and aware of the negative events experienced in the health field may be influential in this result. In our study, the anxiety score of the 31-60 year old patients was found to be significantly higher. We attribute this to the sense of responsibility the patients participated in our study feel towards their family due to the fact that most of them are married.

Arellano et al. utilized anxiety measurement tools to determine the timing of the preoperative visit in their study, measured the anxiety levels of patients one week, one day and just before the surgery and reported to find no significant differences between the three groups [24]. Lichtor et al. investigated whether the anxiety level measured in the afternoon of the day before the surgery reflects the anxiety level just before surgery and stated that there exist a high correlation of 70% between the anxiety levels measured in both periods [25]. Similarly, Badner et al. found that the anxiety level measured in the afternoon of the day before surgery shows a correlation of 73% with the level just before the surgery [1]. In our study, as we performed anxiety measurements during the evaluation of the patient in the anesthesiology outpatient clinic, it was not possible to standardize the timing of anxiety assessment.

According to studies conducted, the effect of education level on the anxiety level shows variation. Moerman et al. reported that the preoperative distress substantially stems from ignorance [17]. Based on this finding, it can be expected that in educated patients, the unknown factor is less effective, thereby the anxiety levels will be low. Caumo et al., on the other hand, reached a conclusion that preoperative anxiety levels are higher in individuals with more than 12 years of education, and that as the level of education increases, patients are able to better evaluate the risks of surgery, which in turn may increase anxiety [26]. In contrast, there are also studies indicating that the level of education does not affect the anxiety level[18,19]. No significant correlation between the education status and anxiety was found in our study as well.

Before elective surgery, it is valuable to determine the patient's risk factors, anxiety level and concerns and to implement anxiety management strategies accordingly [27]. In the study conducted by McIntoshh et al., it was found that there was no significant relationship between preoperative anxiety and postoperative recovery [27]. In the present study, the quality of awakening and the quality of recovering values of the patients with high anxiety scores were found to be significantly lower.

In the literature, it is generally accepted that patients have higher anxiety in tumor surgeries or in interventions that will result in organ loss [28]. Caumo et al. noted that while minor surgeries do not change the anxiety level, medium and major surgeries increase it [26]. The same study also revealed the history of cancer to be associated with increased anxiety. Moerman et al. detected that the type of surgery do not alter the anxiety level [17]. One of the limitations of our study was that the surgeries performed on the patients were not standardized. No grouping was made also within the departments where the patients were operated for elective surgery. No statistically significant correlation was detected between the surgical department and anxiety due to the small sample size in our study. A recently published study reported that

depression rates are likely to be higher in females, those without partner, those living alone and the elderly . In another study, it was stated that depression scores are significantly higher in females, but depressive symptoms are not associated with age, education, marital status, social support, clinic where the patient hospitalized, and length of hospitalization [29]. Supporting the previous studies, females were observed to be more depressive than males in our study.

Individuals with low education level is more likely to experience depression. These cases are also less likely to respond to therapy. Those with high level of education develop effective skills to cope with stress. Accordingly, they do not perceive the pressures created by environmental and developmental changes as threatening. Thus, their anxiety level does not increase. Similarly, the patients with a primary school degree or literate were more depressive than those with college degree in our study as well.

The quality of recovery at the postoperative first day and first month in our study was assessed via the QoR-40 scoring tool.The QoR-40 has been indicated to be a useful tool to determine the quality of recovery of patients undergoing surgery after anesthesia [30-32]. It has been the most frequently reported measure that indicates patient-centered recovery quality after surgery [33,34]. As the QoR-40 can make a distinction between males and females, the evidence for its content validity is strong [32]. In general, females are known to have a poor post-operative recovery. In the meta-analysis conducted by Gornall et al., although males were observed to have higher QoR-40 scores than females, other factors influencing recovery, such as patient age and surgery size, were not balanced while making this comparison [31]. A recently carried out study has specifically balanced these factors and been able to characterize a clear gender difference [35]. In our study, the quality of recovery value, which we assessed in the first month, was found to be significantly lower in females, supporting previous studies conducted in this regard [36]. The quality of recovery is directly associated with patient satisfaction [36]. No significant correlation was detected between the education status of the patients and the quality of recovery in our study.Patients state that mental problems caused by depression lead to impairment in functionality and distress. The co-occurence of pain and depression is a field that has been much investigated with both its etiology and symptom association. It was observed in our study that the quality of recovery was poorer in the patients with high depression scores.

The biggest limitation of our study is that it was studied from different departments and different types of surgery. Types of surgery are not homogeneous. More studies are needed on this subject.

Conclusion

In conclusion, surgery with its both anesthesia and surgical dimensions is a stress factor for patients. The anxiety and depression levels of the patients in the pre-operative period were detected to be high. It was seen that this condition affected the quality of recovery, which is the indicator of the quality of anesthesia in the post-operative period. Endeavours towards reducing anxiety and depression levels of patients in the pre-operative period will directly influence the patient satisfaction, quality of recovery and quality of anesthesia.

Conflict of interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical approval
The study was initiated with the approval of the Tokat Gaziosmanpasa University, Medical Faculty Ethics Committee (Date: 2013, Decision No: 13-KAEK-094). All procedures were performed adhered to the ethical rules and principles of the Helsinki Declaration.

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