



Original research

Prediction of anxiety and depression in general surgery inpatients: A prospective cohort study of 200 consecutive patients



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HIGHLIGHTS

- The definition of health pays a special attention to mental and social well-being.
- The objective was to assess anxiety and depression with HADS tool in surgical inpatients.
- Female gender, age over 35, low socioeconomic and education status were associated with anxiety.
- Low education and longer hospital stay (>7 days) were associated with depression.
- Based on psychological status of the patients, application of preventive measures should be considered.

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ABSTRACT

Introduction: Surgery is a major stress factor for patients, and is associated with significant anxiety or depression. The Hospital Anxiety and Depression Scale is one of the most common instruments used for assessment of patients' psychological stress. Here, we aimed to identify predictors of anxiety and depression in surgical inpatients.

Methods: The study group consisted of consecutive two-hundred patients who completed the Hospital Anxiety and Depression Scale questionnaire. A patient scoring more than cut-off values (10 for anxiety and seven for depression) was considered as being at risk of anxiety or depression. Demographical data, socioeconomic status, education level and diagnoses were recorded. The Chi-square, Fisher's exact, Mann–Whitney, Kruskal–Wallis tests and binary logistic regression analysis were used to identify the predictive parameters for anxiety and depression.

Results: It was found that female patients, patients older than 35 years, patients with low socioeconomic status and low education level had a relatively higher risk of anxiety. In addition, patients with low education and a hospital stay greater than seven days were at risk of depression. Logistic regression analysis revealed that socioeconomic status and education level were strongly predictive for anxiety. However, presence of anxiety was shown to be strongly predictive for depression.

Conclusion: Healthcare providers should be aware of their patients' psychology and, therefore, it is recommended to consider predictive factors for anxiety and depression.

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1. Introduction

The definition of health was made by the World Health Organization and entered into force in 1948. This definition pays special attention to mental and social well-being, not only the absence of disease [1]. Patients who are admitted to hospital experience acute psychological distress in addition to the burden of the disease condition. Hospitalized patients who undergo operation experience the physical trauma of surgery, as well as the fear and anxiety

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of possible outcomes [2]. Patients experience many challenges including the exact nature of the disease and proposed treatment modalities, uncertainty about the surgery, and postoperative period [3,4]. Anxiety in surgical patients has been well studied, with most such studies being performed by authors from nursing departments [5–10]. Given that the stabilization of anxiety and psychological condition in hospitalized patients is a routine part of nursing care, the psychology of patients can be easily overlooked by surgeons.

Illnesses may lead to mental, emotional, social or psychological side effects [11] and this effect is especially evident in patients admitted to surgical clinics. Surgery is a major trauma and stress factor for patients, and is associated with significant anxiety or depression. An elevated anxiety level increases the risk associated with surgery, including the morbidity and mortality [12]. Many physiologic systems including the central nervous, endocrine and immunologic systems are activated in response to a stress [13,14]. Consequently, wound healing delays, need for analgesia, risk of postoperative complications, and the length of hospital stay can all be increased by stress, ultimately increasing the risk of mortality and morbidity [15].

The department of general surgery provides comprehensive consultation and care in many subspecialties, including elective and emergency situations and both malignant and non-malignant conditions, offering operative and non-operative treatments according to the disease and condition of the patient. Therefore, the department of general surgery is continually addressing various stressful conditions and diseases. Such stresses often produce miscellaneous psychological problems. Although various aspects of preoperative anxiety in adults have been studied [5,16,17], predictive factors are not evident in general surgery inpatients.

Identification of the patients at risk of anxiety and depression by healthcare providers can be an important issue to deliver the optimum care. For this purpose, it was aimed to identify the level of anxiety and depression in patients admitted to the general surgery clinic, and to assess predictors of these conditions.

2. Material and methods

A descriptive design was used throughout the study. Patients that were admitted and hospitalized into the general surgery department for any reason were evaluated. Patients who give consent to join the study were included into the study group. Patients younger than 18 years-old were excluded from study. The study protocol was approved by the local ethical committee of the hospital. Demographical data were recorded. Socioeconomic status was recorded as either low or normal income. Education level was recorded as either unschooled, high school or university level. Diagnoses were divided into four categories: 1) elective malignancy; 2) elective non-malignant; 3) emergency trauma; and 4) emergency non-trauma. The elective malignancy subgroup included patients who were informed and prepared for surgery with the diagnoses of gastrointestinal, abdominal or breast malignancy. The elective non-malignant subgroup included patients who were prepared for operation (e.g., cholecystectomy, hernia repair and thyroidectomy). The emergency trauma subgroup included patients who were admitted to the hospital for emergency trauma. The emergency non-trauma subgroup included patients who required surgery or medical treatment with diagnosis of acute appendicitis, acute pancreatitis, gastrointestinal hemorrhage or diverticulitis. The length of hospital stay of the patients was recorded. Anxiety and depression was assessed using the Hospital Anxiety and Depression Scale (HADS) [18]. The HADS form was used at discharge of the patients. The form consists of 14 questions; with each statement have Likert-type answers of four responses,

which are graded from 0 to 3. The HADS is divided into two sections, one that addresses anxiety and one that addresses depression. The maximum possible score for each section is 21. A patient scoring 11 or more on either section was considered as being at risk of anxiety or depression [18,19]. The Turkish reliability and validity of the scale was assessed by Aydemir et al. [20] and new cut-off values (10 for anxiety and seven for depression) were proposed. The latter cut-off levels were used for defining the risk of the patients' anxiety and depression. This study designed as fully compliant with the STROBE criteria [21].

3. Statistics

Statistical calculations were performed using IBM SPSS 22 (IBM SPSS, USA). Variables are expressed as mean $\pm$ standard deviations (SD) or as medians (range) depending on their distribution. Categorical variables were expressed as frequencies and percentages. The Chi-square and Fisher's exact tests were used for comparison of continuous parametric variables. The Mann–Whitney and Kruskal–Wallis tests were used for comparison of parametric variables without normal distribution. Binary logistic regression analysis, which involved age, sex, level of income and education, diagnoses, status of admission and operation and length of hospital stay, was used to identify the predictive value of anxiety and depression. The statistical results were presented with a 95% confidence interval. The differences were considered statistically significant if the *p*-value was less than 0.05.

4. Results

Two-hundred consecutive patients constituted the study group. The mean age of the patients was 46.3 ± 15.8 years-old and ranged from 18 to 75. One-hundred-nine of the participants (54.5%) were male and 91 (45.5%) were female.

The Cronbach alpha coefficient of the HADS form used in this study is 0.81 for anxiety and 0.78 for depression. The mean HADS score of the patients was 6.83 ± 5.06 for anxiety and 7.43 ± 3.64 for depression (Table 1). Female gender, age >35 years, low socioeconomic status, unschooled educational status and non-operative treatment were significantly associated with higher anxiety scores. For depression, unschooled educational status, emergency admission, admission due to emergency trauma and hospitalization longer than two days were significantly associated with higher scores.

After cut-off level analysis, 62 (31%) and 112 (56%) patients had risk of anxiety and depression, respectively (Table 2). Female gender, age >35 years, low socioeconomic level, low education status, non-operative treatment and hospitalization longer than two days were the factors associated with an increased risk for anxiety. Logistic regression analysis for anxiety revealed that socioeconomic level and education level were the strongest predictive factors for anxiety with a Nagelkerke R^2 of 13.6% (Table 3). Low education status and length of hospital stay greater than seven days were the risk factors for depression. Logistic regression analysis for depression revealed that the presence of anxiety was strongly predictive for depression with an odd's ratio of 4.5 and Nagelkerke R^2 value of 13% (Table 3).

5. Discussion

In the present study, it can be possible to detect the incidence of anxiety and depression seen in surgical inpatients by using HADS, and to identify risk factors. The results of this study showed that approximately half of inpatients have depression and around one quarter have anxiety indicating that these conditions are not rare.

Table 1
Anxiety and depression scores in study group.

	Anxiety score		Depression score	
	$\bar{x}$ ($\pm$ sd)	p	$\bar{x}$ ($\pm$ sd)	p
Study group (n = 200)	6.8 (5.1)	N/A	7.4 (3.6)	N/A
Gender				
Male (n = 109)	6.2 (5.2)	^a 0.026	7.4 (3.8)	^a 0.926
Female (n = 91)	7.6 (4.9)		7.5 (3.5)	
Age				
≤35 (n = 55)	5.6 (4.4)	^a 0.045	7.3 (4.0)	^a 0.411
>35 (n = 145)	7.3 (5.2)		7.5 (3.5)	
Income				
Low income (n = 64)	8.3 (5.8)	^a 0.014	7.7 (4.1)	^a 0.593
Normal income (136)	6.1 (4.5)		7.8 (3.4)	
Education level				
Unschooling (n = 32)	9.7 (5.0)	^b 0.001	8.7 (3.2)	^b 0.019
High school (n = 148)	6.5 (5.0)		7.3 (3.6)	
University (n = 20)	5.0 (4.1)		6.1 (3.9)	
Diagnoses				
Elective malignant (21)	8.1 (5.8)	^b 0.439	7.4 (2.7)	^b 0.043
Elective non-malignant (97)	6.2 (4.6)		6.8 (3.5)	
Emergency trauma (10)	7.9 (5.9)		9.7 (4.0)	
Emergency non-trauma (72)	7.2 (5.3)		8.0 (3.9)	
Admission				
Elective (118)	6.5 (4.9)	^a 0.435	6.9 (3.3)	^a 0.020
Emergency (82)	7.3 (5.3)		8.2 (3.9)	
Operation performed				
Yes (n = 158)	6.4 (4.8)	^a 0.035	7.2 (3.5)	^a 0.126
No (n = 42)	8.6 (5.8)		8.2 (4.0)	
Length of hospital stay				
≤2 days (n = 119)	6.2 (4.5)	^a 0.136	7.0 (3.6)	^a 0.019
>2 days (n = 81)	7.7 (5.8)		8.1 (3.6)	
≤7 days (n = 172)	6.6 (4.9)	^a 0.153	7.1 (3.7)	^a 0.002
>7 days (n = 28)	8.3 (5.7)		9.2 (3.0)	
Are you informed about your illness				
Yes (n = 171)	6.7 (5.0)	^a 0.566	7.5 (3.7)	^a 0.652
No (n = 29)	7.3 (5.3)		7.2 (3.4)	

$\bar{x}$: mean, sd: standard deviation, N/A: not applicable, ^a Mann Whitney test, ^b Kruskal–Wallis test.

Based on our data, it can be predicted that the patients who have any one of the following conditions are at risk of anxiety: >35 years-old, female gender, low income, low education and hospital stay longer than two days. Patients who have a low education or a hospital stay longer than seven days are at risk of depression. By that way, healthcare providers can easily identify the patients with high risk for development of anxiety and depression or both; thus apply some preventive measures during their hospitalization period.

Anxiety or depression in surgical or medical inpatients has been studied by several researchers with variable results. Caumo et al. [16] reported the frequency of high anxiety in inpatients to be as high as 23.9%. Kayhan et al. [22] reported that 37.5% of inpatients had a psychiatric disorder, 14.4% had a mood disorder and 24.2% had an anxiety disorder. Kayhan concluded that mood and anxiety disorder is frequently observed among inpatients. Yazici et al. [23] reported the anxiety and depression among the 239 patients in medical and surgical departments and found that 27.2% and 48.5% of the patients had anxiety and depression, respectively. Yazici did not find any difference between the departments in which the patients were hospitalized. However, only 5.6% (15 patients) of Yazici's study group were from the general surgery department and small number of patients can be considered to be insufficient to present all of complexity of conditions and psychology encountered within a general surgery department. In this study, it was found that 31% of the patients had anxiety and 56% of the patients had depression. By including a large series of patients with diverse conditions, it is believed that the results in the present study can effectively reflect the heterogeneity of any surgical clinic.

Demographic characteristics (gender, age, income and education) have been studied previously with regard to the possible association with anxiety. Female gender has been shown to be related with higher anxiety [17,23], which is in line with the findings of our study. It is thought that women more easily express their anxiety, the separation from their family affects women more, and these differences have been proposed to account for the positive correlation between anxiety and female gender. Although it was that the patients older than 35 years old had higher anxiety than that of younger patients, one previous study with 500 patients showed no correlation between age and anxiety [10]. The level of income and education are other factors affecting anxiety, and these associations have been investigated by several studies with diverse results [16,24,25]. Caumo et al. found that a low level of anxiety in patients with high level of education [16]. Whereas Aykent et al. reported that patients with a higher level of education showed higher anxiety [25]. Other studies have found no correlation between education and anxiety [23]. In present study, low income was found to be related with higher anxiety, and low education was associated with higher anxiety and depression. Therefore, these conflicting results can be explained by the fact that the hometown and the environment that the patients live influence the perception of being ill affecting the degree of anxiety and depression.

The psychological condition of the patients in surgery departments differs according to their diagnoses. It was reported that the type of the operation influences the levels of anxiety and depression [16]. A review study revealed a significant association between depression and painful physical symptoms [26]. In our study, although depression scores were higher in emergency trauma patients, this increase was not sufficient to produce a significant association with depression as defined by a HADS score of >6. It may be expected to reach the significant results if the number of emergency trauma patients is higher than that of the present situation. The psychology of the emergency patients differs from that of the elective patients; the emergency patients feel more frightened and anxious about their condition and outcome. In Turkish population, it is believed that any diseases which can be treated with surgery are associated with a better outcome. This perception may be important in explaining the fact that we found patients who underwent an operation had lower anxiety. A longer hospital stay can worsen a patient's psychological condition. This is explained by the emotional effect of chronic illness and is revealed as the loss of hope for getting well and less satisfaction with the services [27,28]. Prina et al. founded that depression positively correlated with the length of hospital stay [29]. In the present study, patients staying in the hospital for longer than two days had higher anxiety, and their associated depression becomes evident after more than seven days.

Healthcare professionals should predict which patients are at potential risk of anxiety and depression. By that way, it is possible to take appropriate steps such as providing information, listening to problems routinely and using social therapy to ameliorate the condition, thus preventing progression to pathological levels. Givel et al. studied the question of how much information patients want or need prior to surgery and has attracted attention to the importance of not only answering patients' questions, but also making them aware of the available information, thus helping them to get through this difficult process [30]. De Oliveira et al. found that overestimation of perioperative mortality risk is common in patients undergoing general surgery and it is highly associated with preoperative anxiety. The authors offered improved communication strategies to minimize misleading risk perception in surgical patients [31]. In our clinic, all patients and relatives are informed about the illness and their treatment modalities and the expected course of the condition with possible complications is discussed

Table 2

Patients with anxiety and depression risks in study group.

	Anxiety score			Depression score		
	≥10 Risk(+) n (%)	<10 Risk(−) n (%)	p	≥7 Risk(+) n (%)	<7 Risk(−) n (%)	p
Study group (n = 200)	62 (31)	138 (69)	N/A	112 (56)	88 (44)	N/A
Gender						
Male (n = 109)	26 (24)	83 (76)	^a 0.021	58 (53)	51 (47)	^a 0.395
Female (n = 91)	36 (40)	55 (60)		54 (59)	37 (41)	
Age						
≤35 (n = 55)	10 (18)	45 (82)	^a 0.017	26 (47)	29 (53)	^a 0.151
>35 (n = 145)	52 (36)	93 (64)		86 (59)	59 (41)	
Income						
Low income (n = 64)	27 (42)	37 (58)	^a 0.022	37 (58)	27 (42)	^a 0.762
Normal income (136)	34 (25)	101 (75)		75 (55)	61 (45)	
Education level						
Unschool (n = 32)	19 (59)	13 (41)	^b 0.001	24 (75)	8 (25)	^b 0.030
High school (n = 148)	41 (28)	107 (72)		80 (54)	68 (46)	
University (n = 20)	2 (10)	18 (90)		8 (40)	12 (60)	
Diagnoses						
Elective malignant (21)	10 (48)	11 (52)	^b 0.315	14 (67)	7 (33)	^b 0.073
Elective non-malignant (97)	26 (27)	71 (73)		46 (47)	51 (53)	
Emergency trauma (10)	3 (30)	7 (70)		8 (80)	2 (20)	
Emergency non-trauma (72)	23 (32)	49 (68)		44 (61)	28 (39)	
Admission						
Elective (118)	36 (31)	82 (69)	^a 0.877	60 (51)	58 (49)	^a 0.084
Emergency (82)	26 (32)	56 (68)		52 (63)	30 (37)	
Operation performed						
Yes (n = 158)	43 (27)	115 (73)	^a 0.038	83 (53)	75 (47)	^a 0.080
No (n = 42)	19 (45)	23 (55)		29 (69)	13 (31)	
Length of hospital stay						
≤2 days (n = 119)	30 (25)	89 (75)	^a 0.044	60 (50)	59 (50)	^a 0.060
>2 days (n = 81)	32 (40)	49 (60)		52 (64)	29 (36)	
≤7 days (n = 172)	50 (29)	122 (71)	^a 0.185	90 (52)	82 (48)	^a 0.013
>7 days (n = 28)	12 (43)	16 (57)		22 (79)	6 (21)	
Are you informed about your illness						
Yes (n = 171)	53 (31)	118 (69)	^a 1.000	97 (57)	74 (43)	^a 0.688
No (n = 29)	9 (31)	20 (69)		15 (52)	14 (48)	

Risk(+): Risk available, Risk(−): Risk not available, N/A: not applicable, ^a Fisher Exact test, ^b Chi-square.**Table 3**

Regression analysis of study group for anxiety and depression.

Variables	B	S.E.	p	OR	Nagelkerke R ²
Logistic regression analysis of Anxiety					
Education			0.001 ^a		13.6%
Unschool => High school	−1.350	0.409	0.001 ^a	3.86	
High school => University	−2.386	0.835	0.004 ^a	1.08	
Income					
Low => Normal	−0.644	0.336	0.049 ^a	1.78	
Logistic regression analysis of Depression					
Anxiety					
Absent => Present	1.501	0.356	0.001 ^a	4.487	13%

B: Regression coefficient, SE: Standard error, OR: Odds ratio, ^a p < 0.05.

routinely. However, 29 patients (14.5%) in our group expressed that they have not been informed about their illness. These patients did not show a statistically significant difference in their anxiety and depression scores compared to the rest of the study group; therefore we can state that these patients do not affect the integrity of other analysis. Although we attempt to deliver the relevant information to all patients and their relatives, some people may not be able to fully understand explanations about their situation. This is something we must remain aware, and novel strategies should be developed to ensure that every patient receives and understands the information about their illness and treatment.

The HADS tool would allow healthcare staff to identify anxious patients. However, there are concerns about timing of when to give the questionnaire. The level of anxiety and depression would be higher especially in cases with complicated recovery period. But, it has also been thought that answering a questionnaire during

admission could result a negative effect on a patient's anxiety level [9]. Therefore, we performed the survey at the time of discharge of the patients.

The heterogeneity among the number of the patients for each diagnoses subgroups was the main limitation of the study. This issue was considered as a negative impact to reach more significant results. Analysis of the diagnoses groups and admission types in present study revealed no evident differences in anxiety or depression due to the heterogeneity in the general surgery clinic. Future studies including larger series of patients in every situation are needed. Inclusion of the patients into the study in a consecutive manner was another limitation. Differentiation or association of anxiety and depression by application of one or more scales was the major controversy for such questionnaire-based studies due to the fact that depression and anxiety are related conditions. Considering them as separate outcomes in the analysis may not be appropriate.

Therefore, future studies majoring on the patients with anxiety or depression with detailed psychological analysis are needed to clarify this controversy.

6. Conclusion

Because health is defined as complete physical, mental and social well-being, psychological status of the patients should be evaluated by physicians. Great attention seems to be necessary to measure the impact of anxiety and depression on patients' outcome, even at the time of their discharge. For that purpose, use of predictors for anxiety and depression which is feasible in routine practice for general surgery inpatients and application of preventive measures to overcome such situations can be indispensable to improve the psychological status of the patients.

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Author contribution

Fatih Basak – Study design, data collections, statistical analysis, data analysis, writing and manuscript preparation.

Mustafa Hasbahceci – Study design, conduct, data analysis, writing and manuscript preparation.

Sunay Guner – Study design, data collections and manuscript preparation.

Abdullah Sisik – Study design, data analysis, writing and manuscript preparation.

Aylin Acar – Study design, conduct and manuscript preparation.

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Conflicts of interest

None.

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