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Evaluation of Stress Scores Throughout Radiological Biopsies

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Abstract

Background: Ultrasound-guided biopsy procedures are the most prominent methods that increase the trauma, stress and anxiety experienced by the patients.
Objectives: Our goal was to examine the level of stress in patients waiting for radiologic biopsy procedures and determine the stress and anxiety level arising from waiting for a biopsy procedure.
Patients and Methods: This prospective study included 35 female and 65 male patients who were admitted to the interventional radiology department of Kartal Dr. Lütfi Kirdar training and research hospital, Istanbul between the years 2014 and 2015. They filled out the adult resilience scale consisting of 33 items. Patients who were undergoing invasive radiologic interventions were grouped according to their phenotypic characteristics, education level (low, intermediate, and high), and biopsy features (including biopsy localization: neck, thorax, abdomen, and bone; and the number of procedures performed, 1 or more than 1). Before the biopsy, they were also asked to complete the depression-anxiety-stress scale (DASS 42), state-trait anxiety inventory scale (STAI-I), and continuous anxiety scale STAI-II. A total of 80 patients were biopsied (20 thyroid and parathyroid, 20 thorax, 20 liver and kidney, and 20 bone biopsies). The association between education levels (primary- secondary, high school and postgraduate) and the number of biopsies (1 and more than 1) with the level of anxiety and stress were evaluated using the above-mentioned scales.
Results: Evaluation of sociodemographic and statistical characteristics of the patients showed that patients with biopsy in the neck region were moderately and severely depressed and stressed. In addition, the ratio of severe and extremely severe anxiety scores was significantly high. While the STAI-I and II scores were lined up as neck > bone > thorax > abdomen, STAI-I was higher in neck biopsies compared to thorax and abdomen biopsies. Regarding STAI-I and II scales, patients with neck biopsy had the highest anxiety score.
Conclusion: We believe that active briefing of patients who need to undergo neck and bone biopsies and have high anxiety score by healthcare personnel is an effective method to control psychological mood and increase the efficiency of treatment.

Keywords: Stress, Radiogic Biopsy, Anxiety, Depression

1. Background

In recent years, efforts were made to increase the quality of invasive radiology biopsy procedures. New technologies that enabled highest patient compliance were introduced in the medical world. The main principle in these new technologies is to know the stress status of the patient and to get it under control. Biopsies carried out with ultrasonography are the most prominent methods that increase the trauma, stress and anxiety experienced by the patients. Wide knowledge is required to appropriately address the patient's depression, anxiety and stress status, to determine the character analysis and to evaluate the necessity of planning, and to know when and how it should be implemented (1-8).

2. Objectives

In our study, we intended to find the relationship between depression and anxiety, and the stability scale in patients and also the relationship between the stress status of the patient and the phenotypic features, education level, localization, and number of biopsies. We believe that the inferences obtained with this study will support the qualified and effective implementation of the minimally invasive methods.

3. Patients and Methods

3.1. Patient Enrolment

Patients who visited the invasive biopsy section of the radiology department of Kartal Dr. Lutfi Kirdar training

and research hospital were evaluated in three groups regarding their gender and education level (primary school graduate, high school graduate, and university graduate). Biopsy numbers were recorded. Patients, who had advanced disease, weight of less than 55 kg, chronic obstructive lung disease, hearing loss, had received oxygen at home or in the hospital, could not answer the questions due to mental reasons, could not speak Turkish, were illiterate, or pregnant were excluded from the study.

Each type of biopsy was done under appropriate conditions by the operating radiologist and medical personnel including physician assistants and nurse practitioners. They explained everything about the biopsy to the patients and obtained signed informed consent. First, adult resilience scale forms (RSA), which were previously handed out to the patients, were reclaimed. Before the biopsy, they were also asked to complete the depression-anxiety-stress scale (DASS 42), state-trait anxiety inventory scale (STAI-I), and continuous anxiety scale STAI-II. Patients were at liberty with regard to the sequence in which they would fill out the questionnaires. All patients were assured that they would receive a local anesthetic. Patients were grouped according to the number and region of biopsies (neck for parotid and thyroid biopsy; thorax for lung biopsy; abdomen for liver and kidney biopsy, bone for bone biopsy).

3.2. Ethics Committee

All of the patients were informed about the investigation and written informed consent was obtained. The study was approved by the ethics committee.

3.3. Outcome Measures

3.3.1. Resilience Scale for Adults (RSA)

A resilience scale consisting of 33 items was used to measure the patients' resilience. This instrument used a five-point semantic scale format in which each item had positive and negative attributes that were keyed to the right for half of the items to reduce acquiescence biases. The scale consisted of the six aspects of resilience: personal strength/ perception of self (six items, sum score from 6 to 30), personal strength/perception of future (four items, sum score from 4 to 20), structured style (four items, sum score from 4 to 20) social competence (six items sum score from 6 to 30), and social resources (seven items, sum score from 7 to 35). Cronbach's alpha was 0.63, 0.77, 0.60, 0.69, 0.74, and 0.83, respectively. A higher score, positive > 1 indicates high resilience. A lower score, negative $\leq$ 1 indicates low resilience (9, 10).

3.3.2. Depression-Anxiety-Stress Scale (DASS)

DASS is a 42-item self report instrument designed to measure the three related negative emotional states of depression, anxiety and tension/stress. It is developed by Lovibond and Lovibond (1995).

DASS is a set of three self-report scales designed to measure the negative emotional status of depression, anxiety, and stress. Each of the three DASS scales contains 14 items divided into subscales of 2 - 5 items with similar content. Subjects are asked to use four-point severity frequency scales to rate the extent to which they have experienced each status over the past week. Scores for depression, anxiety and stress are calculated by summing the scores for the relevant items (11).

3.3.3. Description of STAI

STAI is one of the most commonly used instruments that includes separate measures of state and trait anxiety. It consists of a 40-item self-evaluation questionnaire. This instrument used all original items with no modification whatsover. The state-anxiety scale (STAI form Y-1) consists of twenty statements that evaluate how respondents feel about anxiety "right now, at this moment" through four scales. The trait-anxiety scale consists of twenty statements that assess how people "generally feel" about anxiety with four scales one (almost never), two (sometimes), three (often), and four (almost always). It is a 20-item self-rating instrument with scores as follows: score 1, not at all; score 2, somewhat; score 3, moderately so; and score 4, very much so. A rating of four indicates the presence of a high level of anxiety and one indicates absence of a high level of anxiety. The anxiety level was found by calculation of scores, The range of scores is from 20 - 80, the higher score indicates greater anxiety (12, 13).

3.4. Statistical Methods

For statistical analysis, SPSS for windows version 15.0 (SPSS Inc., Chicago, Illinois, USA) was used. Descriptive statistics including number and percentage were used for categorical variables. Mean and standard deviation were calculated with minimum and maximum values for numeric variables. If numeric variables were normally distributed, the comparisons between the groups were performed with Student's t-test, comparisons between more than two groups were done with one-way ANOVA test. If numeric variables were not normally distributed, two group comparisons were analyzed with Mann-Whitney U test and comparisons of more than two groups were done with Kruskal-Wallis H test. Subgroup analysis was done with Mann-Whitney U test and was interpreted with Bonferroni correction. The ratios of the categorical variables among

the groups were tested with Chi-square test. If requirements were not met, Monte-Carlo-Simulation was used. The statistical significance level was accepted as $P < 0.05$.

4. Results

The mean age of the patients was 52.2 ± 13.8 years (21 - 87 years). Eighty patients were evaluated demographically regarding education level and number and region of the biopsies (Table 1). Thirty-one patients were females and 49 of them were males. Most of them were old and primary school graduates.

There was no difference in the averages of STAI-I and STAI-II. In the study group, gender and education level had no relationship with the total score of DASS 42, STAI-I and STAI-II scales and stability scale score. In addition, age of the patients had also no relationship with DASS 42 scores and with total levels of STAI-I and STAI-II and stability scale score. There was no significant correlation between the number and region of the biopsies with DASS scale, stability scale score (total), STAI-I and STAI-II scores. Regarding biopsy regions, especially the neck, the severe and extremely severe DASS 42 subscale scores were high (Table 2). STAI-I and II were ranked as neck > bone > thorax > abdomen and STAI-I was higher in the neck biopsies compared to the thorax and abdomen. Patients with neck biopsy had the highest score in STAI-II (Table 3). Regarding thorax region, there was a negative correlation between STAI-I and psychological stability subscale in respect to the perception dimension of the future. There was a negative correlation between STAI -II and total stability scale score, personal power and future perception.

There was no significant relationship between the differences of STAI-I and STAI-II and gender, education level, number and region of the interventions (Table 4).

There was a positive relationship between the differences of STAI-I and STAI-II and DAS 42 and total stability scale score (Table 5).

Table 1. Patient Characteristics

Characteristics	No. (%)
Education level	
Low	33 (41.3)
Intermediate	32 (40.0)
High	15 (18.8)
Number of procedure	
One procedure	61 (76.3)
> 1 procedure	19 (23.8)
Biopsy localization	
Neck	20 (25.0)
Abdomen	20 (25.0)
Thorax	20 (25.0)
Bone	20 (25.0)
Depression DASS	
Normal	40 (50.0)
Mild	14(17.5)
Moderate	19 (23.8)
Severe	7 (8.8)
Anxiety DASS	
Normal	19 (23.8)
Mild	10 (12.5)
Moderate	22 (27.5)
Severe	20 (25.0)
Extremely severe	9 (11.3)
Stress DASS	
Normal	53 (66.3)
Mild	10 (12.5)
Moderate	10 (12.5)
Severe	7 (8.8)

Abbreviation: DASS, depression-anxiety-stress scale

5. Discussion

In this pre-operative sampling group, severe and extremely severe ratios of DASS scores were high in the patients before invasive intervention especially with neck region. It was surprising that stress levels were relatively low in patients before thoracic intervention for breast biopsy. In the study conducted by Flory et al. patients with breast biopsy had higher anxiety levels than patients with more complicated invasive interventions. Uncertainty after interventions was regarded as the main factor for these high levels of anxiety (1). According to studies in the literature, which were focused on this topic, evaluations performed before breast and prostate biopsies showed similar results (14-17). These results confirmed that social factors such as gender, age and education level did not affect this type of psychological perception.

In our study, we observed that patients were affected by instantaneous situations like fear of complications and pain.

The absence of a significant correlation between the number of biopsies and psychological scales was inconsistent with the literature (1-7). The highest anxiety score was encountered in patients with biopsy in the neck region and

Table 2. DASS Scores According to Biopsy Localization

	Biopsy Localization				P Value
	Neck, No. (%)	Abdomen, No. (%)	Thorax, No. (%)	Bone, No. (%)	
Depression DASS					< 0,001
Normal	2 (10.0)	15 (75.0)	16 (80.0)	7 (35.0)	
Mild	3 (115.0)	1 (5.0)	2 (10.0)	8 (40.0)	
Moderate	9 (45.0)	4 (20.0)	2 (10.0)	4 (20.0)	
Severe	6 (30.0)	0 (0.0)	0 (0.0)	1 (5.0)	
Anxiety DASS					< 0.001
Normal	0 (0.0)	10 (50.0)	8 (40.0)	1 (5.0)	
Mild	2 (10.0)	4 (20.0)	3 (15.0)	1 (5.0)	
Moderate	3 (15.0)	4 (20.0)	7 (35.0)	8 (40.0)	
Severe	10 (50.0)	2 (10.0)	1 (5.0)	7 (35.0)	
Extremely severe	5 (25.0)	0 (0.0)	1 (5.0)	3 (15.0)	
Stress DASS					< 0.001
Normal	4 (20.0)	17 (85.0)	18 (90.0)	14 (70.0)	
Mild	4 (20.0)	2 (10.0)	1 (5.0)	3 (15.0)	
Moderate	5 (25.0)	1 (5.0)	1 (5.0)	3 (15.0)	
Severe	7 (35.0)	0 (0.0)	0 (0.0)	0 (0.0)	

Abbreviation: DASS, Depression-Anxiety-Stress Scale

Table 3. STAI-I, STAI-II and RSA Scores According to Biopsy Localization

Scores	Biopsy Localization								P Value
	Neck		Abdomen		Thorax		Bone		
	Mean ± SD	Median	Mean ± SD	Median	Mean ± SD	Median	Mean ± SD	Median	
STAI-I	41.4 ± 9.8	37.5	29.7 ± 6.6	26.5	30.8 ± 8.6	25.5	38.4 ± 10.2	36.5	< 0.001
STAI-II	38.5 ± 4.2	39.5	30.7 ± 6.0	29.5	33.3 ± 6.7	30	38.0 ± 4.3	38	< 0.001
RSA total	100.7 ± 11.7	102	100.0 ± 11.2	99	94.6 ± 7.4	95	92.7 ± 13.5	92	0.914
Personal strength	29.4 ± 6.2	30	29.9 ± 4.4	30	28.2 ± 5.0	29.5	28.7 ± 5.3	29.5	0.946
Self perception	16.7 ± 4.1	16.5	18.3 ± 4.1	18	15.1 ± 4.0	16	16.8 ± 4.4	18	0.118
Perception of future	12.7 ± 3.2	13	11.7 ± 2.4	12	13.1 ± 2.8	13	12.0 ± 2.9	12	0.368
Structured style	9.6 ± 3.8	9.5	11.2 ± 4.1	12	12.1 ± 2.9	11.5	12.3 ± 3.5	13	0.082
Social competence	19.5 ± 4.3	21	19.0 ± 4.4	20.5	15.6 ± 3.2	16.5	15.4 ± 4.3	16	0.838
Family cohesion	20.7 ± 3.5	20	19.0 ± 4.1	18	18.6 ± 4.2	19	17.0 ± 4.9	16.5	0.056
Social resources	21.7 ± 3.2	21.5	20.8 ± 2.9	21	20.6 ± 2.7	20.5	19.4 ± 5.8	19.5	0.384

Abbreviation: DASS, depression-anxiety-stress scale; RSA, resilience scale for adults SD; standard deviation; STAI, state-trait anxiety inventory

it was followed by the bone, thorax and abdomen. One of the conspicuous findings in our study was that the severity ratio of the future perception subscale of the state anxiety psychological stability was low regarding biopsies in the thoracic region.

The psychological scores of the patients with breast and lung biopsies were affected by the personality of the patients.

There was no significant relationship between the difference of continuous anxiety scale and state-trait anxiety

Table 4. Relationship Between Demographic Characteristics and STAI Difference

Characteristics	STAI-II - STAI-I			P Value
	Mean	SD	Median	
Gender		5.9	-1	0.194
Male	0.8	6.2	-3	
Female	-0.6			
Education level		6.0	-3	0.203
Low	-1.0	6.4	-1	
Intermediate	1.4	5.4	-2	
High	-1.1			
Number of Procedures		6.1	-2	0.807
One procedure	0.1	6.2	-2	
> One procedure	-0.4			
Biopsy localization		7.6	1	0.111
Neck	3.0	3.4	-1	
Abdomen	-1.1	4.1	-4	
Thorax	-2.5			
Bone	0.5	7.2	-2	

Abbreviation: STAI, state-trait anxiety inventory; SD, standard deviation

Table 5. Relationship Between Psycological Scores and STAI Difference

	STAI II - STAI I	P Value
	Correlation Coefficient	
Age	-0.037	0.744
Depression DASS	0.516	< 0.001
Anxiety DASS	0.519	< 0.001
Stress DASS	0.539	< 0.001
RSA total	0.242	0.030
Personal strength	0.216	0.055
Self perception	0.348	0.002
Perception of future	-0.036	0.752
Structured style	0.036	0.753
Social competence	0.252	0.025
Family cohesion	0.024	0.832
Social resources	0.073	0.521

Abbreviation: DASS, depression-anxiety-stress scale; RSA, resilience scale for adults; STAI, state-trait anxiety inventory

scale and the gender, education level, number of interventions and biopsy regions. This finding showed that the anxiety level of the patients was not bimodal. The positive correlation of this difference with patient resistance and stress, depression, anxiety scales showed that the selected patient group presented expected psychological reactions. Prior to this type of intervention, in general, patients had anxiety and fear of unknown complications, malformations in the body, deterioration of their life plans, loss of control, mobility and live and they also had a fearful ex-

pectation that the pain would gradually worsen. In such type of interventions, less risky and less invasive diagnostic tests provoke less stress. In some cases, an unpleasant pre-diagnosis is the source of severe stress before the intervention. The stress, which is ignored or not controlled, will not only harm the patient but also the system. Cancelation of appointments, insufficient intervention as a result of lack of patient's cooperation, prolonged intervention durations, and increased drug usage are among these drawbacks (2-6).

Paying attention to giving structured information to patients before and during procedures is important because uncontrolled anxiety may cause complications, adverse events, and inadequate pain control (8, 9, 18).

Bandyopadhyay and Markovic reported that giving information that is easily understood, causes less anxiety and pain (19). Patients with anxiety also tend to have multiple biopsies and they request and receive more medications because of the adverse event. Anxiety scores of our patients were not correlated with the number of procedures.

A limitation of our study was the size of the study. We could not take patients undergoing more therapeutic invasive procedures like fibroid embolization or hepatic chemoembolization. Moreover, it was not possible to manage more biopsy waiting patients by asking so many questions about their mood.

In our study, we designed our investigation with diagnostic interventions that required only local anesthesia, in order to establish a more homogeneous study group regarding general anesthesia interventions in invasive treatment methods. By comparing anxiety scores of STAI-I and STAI-II, depression, anxiety and stress scores (DASS 42) and stability scale scores, we intended to evaluate whether different age groups, genders, education levels, and different numbers of previous biopsies were affecting reactions against the intervention and whether there was any correlation between them.

As the findings of this study showed, there were regional differences in patients regarding depression, anxiety and stress scales before the biopsy. Therefore, it is important to plan the approach of the healthcare personnel and to give sufficient and region-specific information to patients. In conclusion, based on anxiety scores, we saw that head and neck regions caused more stress for the patients during biopsy. Therefore, biopsies involving those regions require more explanations with details of relevant anatomy and biopsy route for obtaining patient trust. Conversations supplying answers to patients about what they would experience during biopsy may provide sedative effect for successful radiological biopsy.

Footnotes

Authors' Contributions: The study was designed by Ozlem Turkoglu. Data were collected by Ozlem Turkoglu, and Hasan Huseyin Mutlu. Analysis and interpretation of the data, drafting of the manuscript, and critical revision of the manuscript for important intellectual content were performed by Ozlem Turkoglu, and Hasan Huseyin Mutlu.

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