



# Is It Possible to Increase the Diagnosis Rates of Depression, Anxiety and Adult Attention Deficit Hyperactivity Disorders in Emergency Departments: A Prospective Study from Turkey?

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## Authors' contributions

*This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

**Aim:** Psychiatric disorders are common in society, particularly among patients in hospitals and emergency departments. Physicians may overlook psychiatric disorders. Improper diagnosis and treatment of psychiatric disorders may have harmful effects on patients and society. Depression and anxiety may be present in emergency room patients, but prevalence of attention deficit hyperactivity disorder are unknown. We aimed determine whether it is possible to increase the rates of diagnosis of depression, anxiety disorders and Adult Attention Deficit Hyperactivity Disorders (ADHD), which are common in society, using psychiatric rating scales for patients.

**Materials and Methods:** Sociodemographic data form, Hospital Anxiety Depression Scale, Adult Attention Deficit Hyperactivity Disorder (ADHD) Self-Report Scale and Emergency Department

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Patient Satisfaction Survey were administered to randomly selected patients on randomly selected days over a 3-month period. Diagnoses in the hospital records and scale cutoff scores were compared.

**Results:** Depression was identified in 99 patients, anxiety disorder in 21, and ADHD in 11 of 223 patients. With these scales, the diagnosis rates of depression, anxiety, and ADHD increased from 0% to 49%, 25.2%, and 5.4%, respectively.

**Conclusion:** Scales that can be filled out by patients in emergency departments are useful for diagnosing psychiatric disorders. With the help of these scales, with a psychiatric assessment rates of diagnosis and treatment could be increased. We may expect personal, social, and economic improvement with an increase of diagnosis and treatment rates.

*Keywords: Emergency department; depression; anxiety; attention deficit hyperactivity disorder; diagnosis rate.*

## 1. INTRODUCTION

Two of five patients admitted to emergency rooms have primary or secondary psychiatric disorders [1,2]. This rate may be as high as 90% [3]. In a cross sectional study it was found that one of four people in society had a psychiatric disorder, and this proportion was increasing to 50% among patients in hospitals [4].

Depression and anxiety negatively affect both acute and chronic medical conditions [5]. Attention deficit hyperactivity disorder (ADHD), which is less well known than depression or anxiety, has comorbidity and correlation with many emergencies. It also has a close link to psychiatric conditions such as, suicide, being exposed to violence, Internet abuse, and sexual abuse. Authorities have accordingly stated that diagnosis and treatment of ADHD is important [6].

Patients with psychiatric disorders tend to be referred repeatedly to emergency departments with different clinical presentations [7]. The delay in diagnosis and treatment of psychiatric disorders harms both individuals and society [8]. Depression, anxiety and ADHD affect patient admission, diagnosis, treatment and the post-treatment outcomes, as they affect every aspect of life [9,10]. Diagnosis and treatment of these diseases is important for improving the quality of medical care and preventing wastage of resources on repeated admission and unnecessary medical procedures [2]. Although psychiatric diseases are very important, the rates of accurate diagnosis of patients by emergency physicians and their referral to psychiatric clinics for advanced diagnosis and treatment are very low [7]. To the best of our knowledge there is no

report in the literature of the diagnosis rates of depression, anxiety or ADHD in emergency departments. In this study we aimed to determine whether it is possible to increase the rates of diagnosis of ADHD, depression and anxiety disorders among emergency patients using psychiatric scales. We hypothesized that self rating scales which are filled out by patients in emergency departments can be useful for diagnosing psychiatric disorders more accurately.

## 2. MATERIALS AND METHODS

### 2.1 Study Design

This prospective cross-sectional study was conducted according to the principles of the Declaration of Helsinki after approval of Kafkas University Ethical Committee. In a pilot study, we identified the depression point as  $7.14 \pm 4.01$ . We calculated that at least 178 patients were required if we chose an alpha error of 2.5% and power of 95% for a difference of 1.1. We added 25% to account for misfilling and declining to participate, and confirmed 223 patients as the sample size. We decided to include in the study all admissions between 18 and 65 years old without dementia, psychosis, or orientation disorder. Randomly selected patients, on randomly selected days between December 1, 2013 and April 1, 2014, were informed in writing and verbally after their medical condition stabilized in the emergency department. We requested patients who consented to participate in our study to fill out informed consent forms and questionnaires in a silent room after the end of their treatment. Written informed consent was taken from all participants.

## 2.2 Scales

### **2.2.1 The Hospital Anxiety Depression Scale (HAD)**

It was developed by Zigmond and Snaith in 1983 [11]. It is used to determine the risk, level, and severity of depression and anxiety of the patient. Validity and reliability studies were performed for Turkey by Aydemir et al. [12] Cutoff scores were found to be 10 for the anxiety (HAD-A) and 7 for the depression (HAD-D) subscale. It is used to screen for depression and anxiety, determine the risk group for patients with physical diseases, and refer to medical services. There are 14 questions. Answers are of the Likert type and every question receives 0–3 points. A total of 0–21 points may be scored for either scale.

### **2.2.2 Adult ADHD Self-Report Scale (ASRS)**

ASRS is a self-rating questionnaire and screens for ADHD symptoms for adults and has Likert type answers counting for 0–4 points. There are nine questions for each subscale to evaluate attention deficit (AD) and hyperactivity disorder (HD). Two points above the standard deviation is diagnosed as ADHD. It was developed by the World Health Organization using the DSM-IV ADHD diagnosis criteria [13]. Validity and reliability studies have been performed for Turkey by Dogan et al. [14].

### **2.2.3 Triage coding and triage application table**

Diseases are encoded according to the Ministry of Health's rescript about Emergency Services Practice Procedure and Essentials at Inpatient Health Facilities. Outpatients with minor health issues and stable medical conditions are encoded as green. Conditions that could be life threatening, have a risk of morbidity or loss of a limb, show middle- or long-term symptoms, or have potential severity are encoded as yellow. Life-threatening situations, conditions that require rapid and aggressive evaluation and treatment within 10 min are encoded as red [15].

### **2.2.4 The emergency department patient satisfaction survey**

It was developed by the Ministry of Health of Turkey [16]. It has 10 questions and Likert type answers counting for 1–3. High scores indicate more satisfaction.

## 2.3 Statistical Analyses

Categorical data are shown as % and values obtained by numerical measurement are shown as mean  $\pm$  standard deviation. Values obtained by measurement were tested for homogeneity of variance, normality, and linearity.  $\chi^2$  test was used for categorical data comparison, independent-samples *t*-test for comparison of parametric data between two groups, and one-way ANOVA for comparison between more than two groups, using Bonferroni correction for post hoc comparison. Pearson correlation for correlation, linear regression for regression analyses, and stepwise method were selected.  $p < 0.05$  was accepted as significant for all tests.

## 3. RESULTS

In all, 223 patients satisfying the criteria were interviewed, of whom 14 declined to participate in the study and 7 made errors in the questionnaires, thus 202 patients' results were evaluated. The number of male patients ( $n=111$ ) was greater than that of females ( $n=91$ ); 62.9% of the patients were married and 37.1% single; 35.6% were encoded as green and 64.4% as yellow or red; 79.2% ( $n=122$ ) had an internal disease diagnosis, 20.8% had a surgical diagnosis, and only 0.5% ( $n=1$ ) had a psychiatric diagnosis (Table 1). Considering the cutoff points of the scales, depression was found in approximately half of the patients and anxiety in one fifth (Table 2).

Although there was no difference between the sexes for depression; anxiety ( $p = 0.018$ ), AD ( $p = 0.028$ ), and HD ( $p = 0.025$ ) scores were higher in females. There was no difference between scales for marital status or triage codes. With respect to education, there were differences between groups for depression ( $F = 7.74$ ,  $p = 0.001$ ), anxiety ( $F = 3.60$ ,  $p = 0.014$ ) and AD ( $F = 2.72$ ,  $p = 0.046$ ). A post-hoc test indicated that the uneducated group was the cause of the difference (Table 3).

Depression scores were correlated with anxiety ( $p = 0.001$ ), AD ( $p = 0.001$ ), HD ( $p = 0.003$ ), SD ( $p = 0.001$ ), and age ( $p = 0.001$ ). Anxiety scores were correlated with AD ( $p = 0.001$ ) and HD ( $p = 0.001$ ) (Table 4).

For a linear regression model with anxiety as the dependent variable, depression and AD were found as predictor variables ( $F = 54.77$ ,  $df = 3$ ,  $p = 0.001$ ,  $R = 0.68$ ,  $R^2 = 0.46$ , adjusted  $R^2 =$

0.46) (Table 5). For a linear regression model with depression as the dependent variable, anxiety, age, and AD scores were found to be predictors ( $F = 46,43$ ,  $df = 3$ ,  $p = 0.000$ ,  $R = 0.65$ ,  $R^2 = 0.43$ , adjusted  $R^2 = 0.42$ ) (Table 6).

**Table 1. Clinical and socio-demographic features of participants**

Features	Number (%)	Mean $\pm$ sd
Age		42.6 $\pm$ 20.30
<b>Gender</b>		
Female	91 (45)	
Male	111 (55)	
<b>Marital status</b>		
Married	127 (62,9)	
Single	75 (37,1)	
<b>Education</b>		
None	43 (21,3)	
Below high school	78 (38,6)	
High school	29 (14,4)	
Over high school	52 (25,7)	
<b>Work status</b>		
Employed	43 (21,3)	
Unemployed	159 (78,7)	
<b>Triage code</b>		
Green	72 (35,6)	
Yellow	50 (24,8)	
Red	80 (39,6)	
BMI		25.98 $\pm$ 10.53
HAD - Depression		7.22 $\pm$ 4.06
HAD - Anxiety		7.71 $\pm$ 4.09
EDP Satisfaction		28.55 $\pm$ 2.28
ASRS - AD		14.10 $\pm$ 6.13
ASRS - HD		14.69 $\pm$ 5.39

*Sd, standard deviation; BMI, body mass index; HAD, Hospital Anxiety Depression Scale; EDP, Emergency Department Patient; ASRS-AD, Adult ADHD Self-Report Scale Attention Deficit Sub-scale; ASRS-HD, Adult ADHD Self-Report Scale Hyperactivity Sub-scale*

**Table 2. Presence of psychiatric disorders according to the scale cutoff points**

Scale points	Present N (%)	Absent N (%)
Depression	103 (51)	99 (49)
Anxiety	151 (74,8)	21 (25,2)
ADHD	191 (94,6)	11 (5,4)
ADHD, Attention Deficit Hyperactivity Disorder		

#### 4. DISCUSSION

The results of our study showed that after filling three scales, the rates of diagnosis depression,

anxiety, and ADHD increased from 0% to 49%, 25% and 5.4% respectively. There was no difference between scales for triage code and treatment methods (Table 3). It was helpful to use the scales for all triage codes and patients who received medical or surgical treatment.

Psychiatric emergencies are common in emergency departments. Psychiatric patients are often referred to emergency departments with non-psychiatric symptoms. Sometimes it can be readily observed that the only problem is psychiatric. Psychiatric and organic problems can be found together. Moreover, sometimes the problem can originate from previous problems such as alcoholism or substance abuse. As a consequence, the organic symptoms can hide the psychiatric problems. They can go unnoticed in the busy and stressful atmosphere of emergency departments. Emergency physicians may not pay attention to psychiatric symptoms because they do not see them as life-threatening conditions, or think that they are unimportant medical conditions. They may be hesitant of patients' and patient relatives' reactions if they diagnose a psychiatric condition. Emergency physicians may have inadequate knowledge of psychiatric disorders. Because of their workload, physicians may not give enough time to patients to describe their psychiatric problems. Very few patients with psychiatric problems are directed to psychiatry clinics [17]. Patients' psychiatric problems limit the possibility of understanding their current medical diagnosis, severity, and treatment [18]. Diagnosis of psychiatric diseases in emergency patients will prevent their repeated referral to the emergency departments and reduce the diagnosis and treatment costs by directing them to psychiatry clinics [19], reducing the workload of emergency physicians. There will be a positive economic impact. Diagnosis and treatment of depression can save 50 dollars per day [20].

Four of five patients admitted to emergency departments are diagnosed with a medical disease but none are diagnosed with depression, anxiety disorder or ADHD. Inability to diagnose psychiatric diseases at emergency departments is not specific to our study. In another study, 9% of patients were diagnosed with a psychiatric disease, 47% with anxiety, and 23% with depression [17]. In another study of geriatric patients, none of them were diagnosed despite expecting depression in 27% of them [21]. In a study of trauma patients, 88% of patients with sharp-object injury and 47% of the patients with

blunt trauma were found to have had severe psychiatric problems before the incident. Only 14% of them were diagnosed in emergency departments [3]. In another study of trauma patients, the effects of a psychiatric perspective were studied. With a psychiatrist in the medical team, the rates of diagnosis and treatment of a psychopathology increased by 80% [22].

We found that almost half of the patients in our study could have depression and one fourth of them could have anxiety disorder. Our rates are higher than those reported for other studies of the prevalence of depression in emergency departments. In a study in the U.S., the rate was 30% [23] and in Europe it was 23% [17]. Kars is one of the underdeveloped regions in Turkey [24]. The high rates of depression in our study could result from the prevalence of depression in

Kars for socioeconomic reasons. Almost one fourth of the patients had anxiety. Our result is consistent with those of other studies. Studies have shown both higher and lower rates [2,17]. Differences between culture and study methods could explain this situation. In some studies, anxiety rates were higher than depression rates in emergency rooms [2,17]. Interestingly, we found higher depression rates than anxiety rates in our study. Higher depression rates in Kars could account for the difference, but we could find no reports supporting this idea. Another reason could be visits by non-emergency patients to emergency departments. Management of non-urgent patients in emergency departments free of charge for 24 hours could increase the number of patients in emergency departments instead of outpatient clinics in Turkey.

**Table 3. Comparison of scale scores of participants in the study**

Variables		HAD-D	HAD-A	ASRS-DE	ASRS-HD	PUKİT
<b>Gender</b>						
Female	91	7.79±4.30	8,47±4,47*	15,16±6,66*	15,63±5,26*	5,22±2,58
Male	111	6,76±3,80	7,08±3,68	13,22±5,54	13,92±5,40	4,78±2,65
<b>Marital status</b>						
Married	127	7,60±4,12	7,93±4,15	14,31±6,44	14,68±5,30	4,94±2,61
Single	75	6,59±3,99	7,33±4,00	13,74±5,59	14,71±5,58	5,04±2,65
<b>Education</b>						
None	43	8,91±3,99***	9,33±3,85*	16,40±5,93*	16,24±5,26	5,58±3,18*
Below High School	78	7,88±3,86	7,71±4,01	13,70±6,60	14,00±5,46	5,28±2,48
High School	29	5,55±3,75	6,62±3,70	12,96±4,93	13,55±5,07	3,66±2,51
Over High School	52	5,77±3,85	6,98±4,23	13,44±5,89	15,09±5,40	4,75±2,13
<b>Triage code</b>						
Green	72	6,71±4,22	7,47±4,32	13,99±5,20	14,60±4,82	4,71±2,21
Yellow	50	6,86±3,58	7,48±4,07	12,65±6,41	15,10±6,08	5,02±3,11
Red	80	7,91±4,13	8,06±3,92	15,10±6,59	14,51±5,49	5,19±2,65
<b>Treatment</b>						
Medical	153	7,25±4,06	7,56±4	14,03±6,19	14,85±5,63	4,93±2,55
Surgical	49	7,12±4,08	8,16±4,1	14,32±6,01	14,17±4,56	5,12±2,87

\*p < 0.05; \*\* p < 0.01; \*\*\*p < 0.001

HAD-D, Hospital Anxiety Depression Scale Depression Sub-scale; HAD-A, Hospital Anxiety Depression Scale Depression Sub-scale; ASRS-AD, Adult ADHD Self-Report Scale Attention Deficit Sub-scale; ASRS-HD, Adult ADHD Self-Report Scale Hyperactivity Sub-scale

**Table 4. Correlations between scale scores of participants in the study**

	HAD-A	EDP sat.	ASRS AD	ASRS HD	Age
HAD-D	0.61***	-0.95	0.41***	0.21**	0.29**
HAD-A		-0.06	0.44***	0.24**	0.09***
Satisfaction			-0.09	-0.05	0.075
ASRS-AD				0.62***	-0.04
ASRS-HD					-0.04

\*p < 0.05; \*\* p < 0.01; \*\*\*p < 0.001

HAD-D, Hospital Anxiety Depression Scale Depression Sub-scale; HAD-A, Hospital Anxiety Depression Scale Depression Sub-scale; ASRS-AD, Adult ADHD Self-Report Scale Attention Deficit Sub-scale; ASRS-HD, Adult ADHD Self-Report Scale Hyperactivity Sub-scale.

**Table 5. Multiple regression model with the dependent variable anxiety**

Model	B	Standard error	Beta	t	p
Invariant	0.84	0.62		1,34	0.18
HAD-D	0.49	0.06	0.48	8,13	<0.001
ASRS-AD	0.10	0.04	0.15	2,52	0.01

*HAD-D, Hospital Anxiety Depression Scale Depression Sub-scale; ASRS-AD, Adult ADHD Self-Report Scale Attention Deficit Sub-scale*

**Table 6. Multiple regression model with the dependent variable depression**

Model	B	Standard error	Beta	t	p
Invariant	0.10	0.75		0.14	0.89
HAD-A	0.52	0.06	0.53	8,58	<0.001
Age	0.35	0.01	0.18	3,16	0.002
ASRS-AD	0.11	0.05	0.17	2,73	0.007

*HAD-D, Hospital Anxiety Depression Scale Depression Sub-scale; ASRS-AD, Adult ADHD Self-Report Scale Attention Deficit Sub-scale*

ADHD is another problem that may be seen in emergency patients. As it is considered a precursor of depression and anxiety, it is important to diagnose and treat ADHD (Table 5) (Table 6). Some studies have found that ADHD is common in patients who have accidents, but we could find no studies of ADHD in emergency patients [6]. This situation makes it difficult to evaluate our results. In a community-based study in Turkey that used scales similar to ours, the prevalence of ADHD was found to be 3.8% [25]. We found mean ADHD scores higher in females, consistent with the literature [25]. There were no differences in terms of triage codes or medical diagnosis groups.

It is the first study to investigate the prevalence of ADHD in emergency departments and shows that diagnosis rates could be increased significantly by using ASRS scale. Nonetheless, there are some limitations to our study. First is that we did not perform psychiatric evaluation. With a psychiatrist on the medical team, rates of diagnosis psychiatric diseases can increase [23]. Knowing that a psychiatrist will examine the patients, emergency physicians should focus on

psychiatric problems too much. This could be a bias. Therefore we accordingly chose not to perform psychiatric examination. But on the other hand if psychiatric evaluations were made more accurate diagnoses could be achieved. So these results should be interpreted carefully. Second limitation of the study is that likely organic causes of these psychiatric diseases like anemia, viral infections and side effects of drugs were not assessed in the emergency room.

Being cross-sectional and regional, not including children, adolescents, and patients aged over 65 years old were other limitations of the study.

## 5. CONCLUSION

Depression, anxiety and ADHD are common problems at emergency departments and they can be underdiagnosed just because of lack of time. Patients are usually not willing to mention about their mood status or psychological problems. Use of scales in emergency departments could increase the rates of diagnosis. But as it is difficult to diagnose ADHD with significant overlap of symptoms with anxiety disorder, mood disorders and certain personality disorders the exact diagnosis must be placed after a psychiatric evaluation by a psychiatrist. With the diagnosis and treatment of these conditions overall quality of care will improve by such holistic assessment of the patients.

## ETHICAL APPROVAL

This study was conducted according to the principles of the Declaration of Helsinki after approval of Kafkas University Ethical Committee.

## COMPETING INTERESTS

All authors declare that no competing interests exist.

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