ARCHIVES OF
Clinical Psychiatry
Revista de Psiquiatria Clínica

ISSN 0101-6083
Online version: www.archivespsy.com
iPad edition: APPSTORE/categoria MEDICINA/Psiquiatria Clinica

VOLUME 47 • NUMBER 1 • 2020

Editors

Editorial Board

INSTRUCTIONS FOR AUTHORS
Available on the journal's website (www.archivespsy.com) and published in the last issue every year (number 6).

We would like to thank the artist Laila Gattaz, who gently allowed, for exclusive use on the covers of the Archives of Clinical Psychiatry, the series of art works named "Imagens de São Paulo".

This journal is printed on acid-free paper.

CATALOGUING IN PUBLICATION (CIP) DATA

Archives of Clinical Psychiatry / University of São Paulo Medical School. Institute of Psychiatry - vol. 47, n. 1 (2020). – São Paulo: / IPq-USP, 2011-

From volume 29 (2001), the articles of this journal are available in electronic form in the SciELO (Scientific Electronic Library Online) database.

1.1. Clinical Psychiatry. University of São Paulo Medical School. Institute of Psychiatry.

ISSN : 0101-6083 printed version

ISSN : 1806-938X online version

CDD 616.89

Indexing Sources

- ISI (Institute for Scientific Information)
  - Science Citation Index Expanded (SciSearch®)
  - Journal Citation Reports/Science Edition
- EMBASE - Excerpta Medica Database
- LILACS - Literatura Latino-Americana e do Caribe de Informação em Ciências da Saúde
- PERIODICA - Índice de Revistas Latino-Americanas em Ciências
- SciELO - Scientific Eletronic Library Online
- SIIC - Sociedad Iberamericana de Información Científica
- Scopus (www.scopus.com)
- Gale Cengage Learning
- DOAJ - Directory of Open Access Journals
- HINARI - World Health Organization

Segmento Farma editores

Rua Anseriz, 27, Campo Belo – 04618-050 – São Paulo, SP. Fone: 11 3093-3300 • www.segmentofarma.com.br • segmentofarma@segmentofarma.com.br

Cód. da publicação: 24354.2.20

Todos os anúncios devem respeitar rigorosamente o disposto na RDC nº96/08

Financial Support

CEIP Centro de Estudos do Instituto de Psiquiatria

CNPq Conselho Nacional de Desenvolvimento Científico e Tecnológico

INDEX

VOLUME 47 • NUMBER 1 • 2020

Original articles

Letter to the editor

Original article

Gestalt contact styles in OCD patients: a controlled study

Hüseyin Ünübol[1]
https://orcid.org/0000-0003-4404-6062

Meltem Topaloğlu[1]
https://orcid.org/0000-0002-6998-4429

Received: 12/17/2018 – **Accepted:** 11/05/2019
DOI: 10.1590/0101-60830000000221

[1] *Psychology, Uskudar University, Istanbul, Turkey.*

Abstract

Background: Obsessive-compulsive disorder is a challenging disease in terms of remission rates and treatment approaches. All theoretical approaches are needed for a better understanding. Compared to other theories, it has not been examined sufficiently from the perspective of gestalt theory in the literature. **Objective:** To examine and compare the Gestalt Contact Styles of patients with obsessive-compulsive disorder (OCD) and the Control Group and to examine the relationship between Gestalt Contact Styles and OCD symptoms. **Methods:** 50 OCD patients were compared with the healthy control group. All patients were evaluated with the Yale Brown Obsessive-Compulsive Scale (Y-BOCS), the Padua Inventory (PI), and the Gestalt Contact Styles Scale-Revised Form (GCSS-RF). For the control group, GCSS-RF was applied. **Results:** The scores of the OCD patients for GCSS-RF "Retroflection" and "Deflection" subscales were significantly higher than the Control Group. Statistically significant high scores were found between the subscales of Padua Inventory "contamination obsessions and washing compulsions", "obsessional thoughts", "obsessional impulses" and "checking compulsions" subtypes and Gestalt contact styles in the Patient Group in a symptomatological examined manner. With these findings, in terms of Gestalt Contact Styles, it is seen that the difference between Patient and Control Groups is significantly different. There was no significant relationship between the Yale-Brown total score of the Patient Group and the GCSS-RF subscales. **Discussion:** In conclusion, the findings of the study showed significant differences in terms of Gestalt Contact Styles (Retroflection, Contact, Deflection, Desensitization, Confluence) in Patient and Control Groups and OCD symptoms. These results are important to Gestalt Therapists in terms of shedding light on the therapeutic intervention to be done for an OCD patient and contributing to the literature.

Ünübol H, Topaloğlu M / Arch Clin Psychiatry. 2020;47(1):1-6

Keywords: Obsessive-compulsive disorder, gestalt theory, contact styles.

Introduction

Obsessive-compulsive disorder (OCD) is a mental health disorder that causes low social and occupational functioning in addition to low quality of life[1,2]. OCD is characterized by two main symptoms: obsessions and compulsions. Obsessions are persisting, intrusive thoughts or images[3] leading to lasting worries and compulsions that are repetitive compensatory behaviors to reduce obsessions-related anxiety. In Salkovskis[4] (1985), Beck's (1976) cognitive OCD theory of cognitive anxiety theory argues that the main problem of OCD is not their own ideas (ie, obsessions). Those who are OCD are more negative and more conscious of this belief in obsession than what is seen in other people[4]. Cognitive behavior therapy (CBT) and exposure-based interventions are first-line psychological treatments for OCD, but only 50% of people benefit from treatment when considering treatment rejection and quitting rates[5-7]. For the last two decades, special efforts have been made to clarify the nature and content of the assessment of obsessions, but nevertheless have not resulted in any improvement in treatment. Most treatments for OCD currently focus on symptom reduction (ie, exposure and response prevention)[8]. However, interpersonal difficulties in the treatment of OCD are also subject to special attention[9]. Previous research has shown that factors such as low self-esteem, avoidance of activities and people, lack of closeness in relationships and fear of rejection by others in OCD patients are causing an increase in obsessions and compulsions[10].

Historically, other factors linked to OCD have been guilt or moral sensitivity issues[11] and have begun to be re-examined as potentially critical factors in continuation of obsessions over time[12]. The role of moral emotions in OCD, especially because of guilt or failure, has long taken a place in OCD phenomenology[11,13-15]. Mancini *et al.* (2004) have shown that raising a sense of guilt and a high sense of responsibility brings more control and more hesitation (ie, obsessive-compulsive tendencies) in a task, more than just individuals who have a high sense of responsibility[16].

Doron and his colleagues point out that OCD individuals have a domain of self-concept in which morality is highly valued, but they feel inadequate[17]. Zhong and Liljenquist (2006) observed that threats to their moral competence in healthy individuals increased their desire to clean themselves[18] (e.g. antiseptic wipes); This has significantly reduced negative moral sentiments (e.g. guilt, regret, etc.) and increased other compensatory behaviors (e.g. voluntary restoration of moral self-esteem to help another work)[19].

The literature also shows that another moral emotion, shame, plays an active role in OCD individuals. It shows that both the shame sensitivity and the changes in shame are related to changes in the severity of symptoms[20]. Most of those with OCD approve rituals of hiding from others[21]. Given the role of thought-action fusion in OCD, it is not hard to imagine that fears of accidental harm to others, pollution of others, or unacceptable thoughts (in other words, sinners, deliberate harm to others, sexual deviance) can cause humiliation.

Shame is a feeling that reflects self-evaluation, such as guilt; such emotions cause not just behavior, but the entire self as negative[22]. For this reason, these emotions tend to be excluded from the field of awareness. Different therapeutic approaches deal with the concept of awareness. Cognitive behavioral therapies have enriched themselves by adding the concept of awareness to their theories, while the Gestalt approach considers that consciousness is the main goal of therapy. The eastern meditation advocates that by using the generic awareness as a base, the individual can focus on the following events by accepting the opinions and feelings of himself and others[23]. Increasing interest in the concept of awareness has led to an increase in the importance of the "now and here" approach. The "now-and-here" approach underlying the base methodology of the existentialist approach is one of the most common concepts

Address for correspondence: Hüseyin Ünübol. 19 Mayıs Mahallesi Bayar Caddesi Mehpare Sokak Demirkol Apartmanı 4/13, Istanbul, Turkey. Telephone: +09 0555 491 11 83. Fax: +90 216 474 12 56.
E-mail: huseyin.unubol@uskudar.edu.tr

adopted by humanist-existentialist approaches. Lately, like cognitive behavioral therapy, many therapies have begun to incorporate the "now-and-here" approach into their theories.

The Gestalt approach is an approach under the umbrella of humanist approaches. It was developed in the 1940's by Fritz Perls, Laura Perls and Paul Goodman[24]. Considering the basis on which the Gestalt therapy approach is based, it can be understood that it is shaped by various theories and opinions such as humanist approach, existential approach, phenomenological approach, holistic view, field theory and Far Eastern philosophy. Gestalt therapy focuses on the present time and adopts the now and now approach. On the other hand, the basic concepts addressed by Gestalt application are concepts such as awareness, communication, forms of communication, personal responsibility[25]. Awareness is a form of experience that is defined as the relationship between the present reality and the individual's own being[26-28]. Awareness involves the accumulation of knowledge about communicating with other people, responsibility for election, self-acceptance, insight, and preconscious[25].

Another strength of Gestalt is a new and deeper understanding of what we mean by support in a relational domain model. In earlier Gestalt's individual self-model, embarrassment was understood more simply as a sense of inferiority[29]. The approach to work with emotional dynamics later claimed that instead of disgracing, assessed shame as the adaptation to social life and claimed that an empathic dialogue could grow[29]. For this reason, empathic understanding through dialogue is seen as an important part of the change process. Investigating the feelings of guilt and embarrassment and determining how the client keeps the obstacles that prevent the client from resolving this conflict is one of the basic goals of the therapeutic approach. Gestalt therapy does not categorize clients according to DSM-5 criteria. Although incompatible with a particular diagnostic context, Gestalt therapy can be adapted to the therapist's ability to work with various disorders[30]. Seligman and Reichenberg (2015) stated that gestalt therapy can be successfully used with the following disorders: emotional disturbances, anxiety disorders, somatoform disorders, artificial disorders, adjustment disorders and some personality disorders or personality traits (evasive, addictive, narcissistic, histrionic and obsessive compulsive disorders)[31]. While observing various case studies and literature reviews, it is clear that Gestalt therapy may be useful with a wide range of mental health problems, including, but not limited to, depression[32], post-trauma, bipolar disorder[30], borderline personality disorder and self-harm[33]), stress disorder, substance abuse, anxiety[34], bulimia nervosa[35], schizophrenia[36] and dementia[37].

Other important concepts in the Gestalt approach are communication and communication styles. These concepts explain how individuals communicate and how they adapt to or differ from their needs and environments. Communication is seen as a source of life for growth. It is also necessary for survival and change[38,39] because the individual exists as part of a particular circle. According to the Gestalt approach, communication means contacting the self and the environment without losing their personality[27]. In fact, all people interact with each other. Nevertheless, it is important to be conscious of how contact is maintained in the process of contact (accommodation variance). How to contact is about communication styles. In line with the principles of the Gestalt approach, there are basically six contact styles: retroflection, desensitization, confluence, projection, deflection, and introjection. It is necessary to raise awareness in order to be able to realize the communication styles. It is also important to raise awareness about communication styles because it helps the individual to understand their resistance and unfinished businesses. Contact is an inevitable part of change and growth[25].

Methods

Participants

This study's universe consisted of voluntary patients, who had obsessive-compulsive disorder at the ages of 18-65 who were treated remotely at the NP Feneryolu Medical Center (N = 32) and Erenköy Mental and Neurological Disorders Training and Research Hospital (N = 18). A group of 50 patients were targeted. Sixty-five patients were interviewed by psychiatrists working in the hospital who made their diagnoses and guiding. It was composed of patients who had been followed up with OCD diagnosis for more than 1 year and had not received any psychotherapy treatment other than drug treatment. 5 people stated that they did not want to be included in the study and 10 people were not included in the study because of the additional diseases such as depression and social phobia which were also confirmed during the interview. After reaching 50 people, relatives of patients with similar socio-cultural characteristics and no active psychiatric illness were tried to reach 50 healthy volunteers who were included in the control group of the hospital staff. Especially gender and age ranges are considered. A total of 100 patients were enrolled in the study, 50 patients (28 female, 22 male, N = 50) with OCD and 50 healthy volunteers (29 female, 20 male, 1 unspecified, N = 50). Üsküdar University Ethics Committee of Non-Invasive Researches approved the study (No: B.08.6.YÖK.2. ÜS.0.05.0.06/2017/140, Date 05.06.2017).

Measures

Yale-Brown Obsessional Compulsion Rating Scale (Y-BOCS)

In 1989, it was developed by Goodman, Price and Rasmussen to measure the type and total severity of Obsessive-Compulsive symptoms[40,41]. The scale is prepared for semi-structured interviews. The scale consists of 19 items and the evaluation is made by the clinician. Each question score ranges from 0-4. Only the first 10 items (except items 1b and 6b) are used to obtain the total score. Obsessions (1-5), compulsions (6-10) subscores and OCD total scores (1-10) are scored separately and the highest score is 40. The Y-BOCS total score is the sum of these top ten items. The Turkish validity and reliability study of the scale was conducted by Karamustafalıoğlu *et al.* in 1993[42]. The Cronbach alpha coefficient of the scale was found to be 0.81.

Padua Inventory (PI)

Padua Inventory is a measure of the severity of the disease and the determination of the predominant symptom distribution in patients with obsessive-compulsive disorder. In addition, it allows the determination of individual severity of differentiated symptoms. Beşiroğlu *et al.* performed the validity and reliability studies of the Padua Inventory together with the original 60 questions[43] and the 41-question forms[44] adapted in 1992. The reliability of this inventory, which was adapted to Turkish in 2005, is 95[45]. The Padua inventory has five subscales: Contamination Obsessions, Obsessive Thoughts, Obsessional Impulses, Checking and Preciseness. Each item is scored between 0-4 according to the response style. The score '0' in the test items corresponds to the absence of any indication or disturbance of the depicted statement, and the score of '4' corresponds to the experience of being overly disturbed or annoying. The total score reflects the level of discomfort arising from all obsessive-compulsive symptoms, it comprises from total score belonging to each subscale and sum of all subscales.

Gestalt Contact Styles Scale-Revised Form (GCSS-RF)

Experimental examination of the contact styles of Gestalt was first carried out by Byrness in 1975. Kepner (1982) developed the Gestalt Contact Styles Scale (GCSS) from the work of Byrness. In 1986, Woldt and Kepner created a 100-item Likert-type Gestalt Contact Styles Scale Revised Form Scale by adding 24 items and increasing the quality of the scale that Kepner developed.

According to the Gestalt theory, the scale that was developed to measure the dominant forms of contact, which is of great importance

in terms of the ways to be followed in diagnosis and therapy, was made usable in our country in 2002 by Aktaş and Daş[46]. As a result of the validity and reliability study, the GCSS-RF 5 factors were separated from 100 items to 61 items (contact, confluence, deflection, retroflection, emotional desensitization). For the 5 factors, the Cronbach Alpha validity coefficient of the scale was changed between 53 and 84. The options of this scale, which are between 1 and 5 Likert types, are "very suitable for me", "suitable for me", "undecided", "not suitable for me" and "not for me at all". Separate scores are reached for each sub-dimension, and high scores indicate that related styles of contact are more dominant.

Work design

The analysis of the data was made with the SPSS 23 program and worked with a 95% confidence level. In the analysis, parametric tests (Independent Groups T Test, One-Way ANOVA) and nonparametric tests (Mann Whitney, Kruskal Wallis) were used, provided that both groups provided the assumption of normal distribution. Participants' variance according to demographic variables of Padua Inventory and sub-dimensions and Returning Points According were analyzed with Mann Whitney and Kruskal Wallis tests and ANOVA and t-tests were used to analyze the Deflection, Contact, Confluence and Emotional Desensitization scores according to differences in demographic variables. In addition, a Correlation Test was applied to determine the direction and strength of the linear relationship between the variables.

Results

Table 1 shows the distribution of patients and control groups according to their demographic characteristics. Among the participants who were sick, the rate of those 25 years and under was 32.0%; The proportion of those between the ages of 26-34 is 46.0%; The proportion of those aged 35 and over is 22.0%; The proportion of women was 56.0% while the proportion of men was 44.0%; The proportion of married persons was 43.5% while the proportion of single persons was 56.5%; The proportion of primary school graduates was 4,0%; The proportion of those with a secondary school diploma was 12,0%; The proportion of those who have graduated from high school was 40,0%; The proportion of those who have a bachelor's degree was 40,0%; The proportion of master degree holders was 4,0%; The proportion of those with a poor economic status was 4.0%; The proportion of those with middle-class economic status was 86.0%; The proportion of those with upper class economic status was 10.0%; The proportion of current employees is 42.0%.

In the control group, The rate of those 25 years and under was 26.5%; The proportion of those between the ages of 26-34 was 44,9%; The proportion of those aged 35 and over was 28.6%; The proportion of women was 59.2% while the proportion of men was 40.8%; The proportion of married persons was 47.9% while the proportion of single persons was 52.1%; The proportion of those who have graduated from secondary school was 4.1%; The proportion of those who have graduated from high school was 24.5%; The proportion of those with a bachelor's degree was 55.1%; The proportion of master degree holders was 16,3%; The proportion of those with middle-class economic status was 89,8%; The proportion of those with upper-class economic status was 10.2%.

Table 2 shows the findings of the Shapiro-Wilk normality analysis in order to examine the normality of the scores. According to the Shapiro-Wilk normality analysis conducted to examine the normality of the scores, Padua Inventory, and its subscales and return scores were not normally distributed ($p < 0,05$); Deflection, Contact, Confluence, and Emotional Desensitization scores were normally distributed ($p > 0,05$).

In Table 3, Patient and Control Group scores of GCSS-RF Deflection, Contact, Confluence, and Emotional Desensitization subscales, t-test results were compared. Since the GCSS-RF Retroflection scores were not normally distributed, the rank averages and the Mann-Whitney analysis were compared (Table 4).

There was a statistically significant difference in Retroflection points between Patient and Control Groups, which was much higher in the patient group than in the rank average group ($p < 0.001$) (Table 4).

There was statistically significant difference between Patient and Control Groups in terms of Deflection score ($p < 0,001$), Contact score ($p < 0,001$) and Emotional Desensitization score ($p < 0,01$). When looked into average scores, while Deflection score is greater in the patient group, Emotional Desensitization and Contact dimension scores are greater in the control group. There was no statistically significant difference between the Patient and Control Groups in terms of the Confluence sub-dimension ($p > 0.05$) (Table 3).

Table 5 contains the Correlation Test findings for the scores the Patient Group received from the scales. There was no significant relationship between the Y-BOCS score and Gestalt Contact Styles

Table 1. Patient and control group distributions by demographic characteristics

		Patient		Control	
		n	%	n	%
Age	25 age and below	16	32,0	13	26,5
	26-34 ages	23	46,0	22	44,9
	35 age and above	11	22,0	14	28,6
Gender	Female	28	56,0	29	59,2
	Male	22	44,0	20	40,8
Marital Status	Maried	20	43,5	23	47,9
	Single	26	56,5	25	52,1
Education Status	Primary School	2	4,0	0	0,0
	Secondary School	6	12,0	2	4,1
	High School	20	40,0	12	24,5
	Undergraduate	20	40,0	27	55,1
	Graduate	2	4,0	8	16,3
	Postgraduate	0	0,0	0	0,0
Socioeconomic Status	Low	2	4,0	0	0,0
	Middle	43	86,0	44	89,8
	High	5	10,0	5	10,2
Are you working now?	Yes	21	42,0	38	77,6
	No	29	58,0	11	22,4

in the Patient Group (p > 0.05). A strong positive relationship was found between the Obsessive Thoughts subscale and the Retroflection subscale (r = 0,505; p < 0,001), a strongly positive relationship between the Obsessive Thoughts subscale and the Deflection subscale (r = 0,556; p < 0,001), and there is a positive moderate correlation between the Obsessive Thoughts subscale and Confluence sub-dimension (r = 0.304, p < 0.05). There was a negative correlation between Contamination Obsession subscale and Deflection score (r = -0,329; p < 0,05). There is a positive moderate relationship (r = 0.344, p < 0.05) between the Checking subscale and the Return score. There is a positive positive correlation between Checking score and Deflection sub-dimension (r = 0.447, p < 0.01). Of the Patient Group there was a strong positive correlation (r = 0,283, p < 0,05) between the Obsessional Impulses and Retroflection subdimension, there was a moderate positive correlation (r = 0,403; p < 0,01) between the Obsessional Impulses subdimension and the Deflection score. There is a positive weak correlation between the Padua Inventory and the Retroflection sub-dimension, a weak positive relationship between the Deflection sub-dimension and a weak positive relationship between the Confluence sub-dimension (Table 5).

Discussion

Our study looked at the differences between OCD and Gestalt contact styles in the healthy population and with the symptoms of OCD patients. According to our results, there was a significant difference between gestalt contact styles in OCD patients and control group. In particular, the "Retroflection" contact style is considerably higher than the control group. This style of contact is a style of contact that the person returns to himself instead of providing it from the outside. They can not express their needs, feelings, and are associated with an intense sense of guilt and responsibility[47]. Especially, instead of expressing their emotions, they succeed in stopping these emotions by exhibiting their behaviors[48]. This can be likened to the compulsive behavior of an OCD patient. In the correlation analysis we conducted, there was a high level of correlation with obsessive thoughts, and significant low-level correlation with obsessional checking and obsessional impulse subdimensions. The obsessive thoughts sub-dimension has the features of disappearance, uncontrollability, guilt, embarrassment and incompleteness[45]. Retroflection contact style users cannot meet the needs directly, and it always leads to an unfulfillment of needs. In the style of an unhealthy retroflection contact, this style of contact turns into a habit, becoming chronic and unnoticeable[46]. Kepner (2014) underlines that those who are shy, bulky, nervous, mixed-minded individuals have negative feelings about themselves[48] and have a high score on the "Retroflection" contact style[46]. In addition, Byrness (1975) associates personality traits such as showing depressive features and lack of activity, loneliness, and confusion in the mind with "Retroflection" contact style[46]. In addition, Kepner (2013) underlines the fact that "retroreflecting" individuals are very careful about being in control and fearful of the disappearance of this control they have developed[49].

Table 2. Examination of the normality of the points that the Patient and Control Group receives from the scales: Shapiro-Wilk normality analysis

	Shapiro-Wilk		
	Statistic	n	p
Obsessive Thoughts	0.922	100	0.000**
Cleaning	0.924	100	0.000**
Control	0.959	100	0.004*
Impulses	0.723	100	0.000**
Precision	0.714	100	0.000**
Padua Inventory	0.934	100	0.000**
Retroflection	0.930	100	0.000**
Deflection	0.981	100	0.166
Contact	0.984	100	0.282
Confluence	0.981	100	0.147
Desensitisation	0.976	100	0.059

* p < 0.01. ** p < 0.001.

Table 3. GCSS-RF: Deflection, Contact, Confluence and Desensitisation subscales average scores, standard deviations and t-test findings of Patient and Control Group

Group		n	Avg	SD	t	p
Deflection	Patient	50	40,44	7,71	11,565	**0.000****
	Control	50	24,22	6,24		
Contact	Patient	50	37,66	5,64	-3,745	**0.000****
	Control	50	41,84	5,52		
Confluence	Patient	50	46,12	5,11	1,172	0.244
	Control	50	44,82	5,96		
Desensitisation	Patient	50	13,06	3,81	-3,299	**0.001***
	Control	50	15,94	4,81		

* p < 0.01. ** p < 0.001.

Table 4. Patient and Control Group's Retroflection sub-dimension of GCSS-RF scale rank averages: Mann-Whitney analysis

Group		n	Order Avg.	U	P
Retroflection	Patient	50	74,38	56,000	**0.000***
	Control	50	26,62		

* p < 0.001.

Table 5. Correlation analysis findings of scores of patients group on scales

		Retroflection	Deflection	Contact	Confluence	Desensitisation
Y-BOCS	r	0.040	0.108	0.084	0.127	0.054
	p	0.783	0.454	0.560	0.378	0.707
	n	50	50	50	50	50
Obsessive thoughts	r	**0.505**	**0.556**	-0.100	**0.304**	-0.187
	p	**0.000*****	**0.000*****	0.491	**0.032***	0.193
	n	50	50	50	50	50
Cleaning	r	-0.248	**-0.329**	0.112	0.101	-0.241
	p	0.082	**0.020***	0.440	0.486	0.092
	n	50	50	50	50	50
Control	r	**0.344**	**0.447**	-0.051	0.228	-0.064
	p	**0. 015***	**0.001****	0.725	0.112	0.658
	n	50	50	50	50	50
Impulses	r	**0.403**	**0.283**	-0.192	0.067	-0.155
	p	**0.004****	**0.047***	0.183	0.644	0.283
	n	50	50	50	50	50
Precision	r	0.183	0.248	0.068	0.209	-0.085
	p	0.204	0.083	0.637	0.145	0.559
	n	50	50	50	50	50
Padua inventory total *score*	r	**0.294**	**0.294**	-0.020	0.293*	-0.259
	p	**0.038***	**0.038***	0.890	0.039*	0.069
	n	50	50	50	50	50

*p<0.05, **p<0.01, ***p<0.001.

So they begin to compensate for the pressure created by emotions in other ways to control their own emotions. We can see such a loop in obsessive-compulsive symptoms seen in OCD individuals. The moral dilemmas suggest that one cannot make peace with himself, that he is alienated from himself, and that his relationship with this style of contact is meaningful.

In the "Deflection" contact style, it is seen that the patient group is using at a rather high level compared to the control group. It is the person's inability to see or hear these messages in order to reduce the number of messages that surround them, or to avoid the emotion that one might have caused by the effects of messages. Individuals who use the deflection contact style, does not pay attention to the person or situation to be contacted instead they tune in to something unrelated[28]. Deflection, as the word implies, it explains blocking or directly avoiding contact[50]. The person keeps himself out of the real process and protects himself from the emotional-intellectual reactions that may occur. However, frequent use of deflection contact style will isolate the person from himself and his surroundings[46]. According to Chan et al. (2015), individuals who frequently use the deflection contact style weaken both their energy and focus on the wrong way of trying to get in touch. As a result, people can not get what they need to satisfy their needs[51]. Another common defensive mechanism in OCD is "reaction formation"[52,53]. Since showing real feelings will not be appropriate in the existing situation, counter-reactions that show the emotions that are opposite to real emotions, but acceptable in that situation develops as a defense mechanism[54]. In the analysis of correlation we made, it was seen that the "Deflection" contact style had a high level of correlation with the obsessional thoughts and the checking, and a low level of correlation with the contamination and the impulses. Therefore, the defense mechanisms used by OCD patients also support the deflection contact style to be meaningful in the Patient Group.

"Contact" and "Emotional Desensitization" styles of contact are higher in the control group than in the patient group. These findings are consistent with the literature. There is more than one study that has a negative relationship between contact dimension and psychopathology[46,47,55]. When the elements of the contact dimension are examined, the elements contain elements for being in a social relationship and being content, forcing the boundaries to reach new things. An incompatible behavior occurs when we do not find a response at the time of personal need. Those who exhibit this behavior use the potential to manipulate others in order to do things they can not do for themselves (instead of making good contact) rather than timely responding to needs. This incompatible function exists with the loss of one's inner awareness and the absence of a good contact relationship[56]. The lack of a meaningful relationship between the "Emotional Desensitization" contact style and PI total score and subscales is consistent with the literature findings[47,55]. The active use of subscales of "Retroflection" and "Deflection" in particular and their high correlation with symptoms suggests that the "Emotional Desensitization" contact is not actively used.

When OCD individuals are evaluated in terms of Gestalt contact styles, it has been seen that the "retroflection" and "deflection" contact forms are intensively used, and in particular are intensively related to the subdimension of obsessional thoughts. OCD has been studied extensively in the literature and can cause considerable loss of capacity. Although studies are being done intensively, the treatment success does not exceed 50%. In this sense, the evaluation of this disease with a new point of view, especially in the perspective of self-worth and moral dilemma, may increase the betterment of interventions for this disease. It helps both to better understand the disease and to provide alternatives to treatments that can yield a much better result in terms of treatment options.

Our study becomes more important as this is the first study in terms of the relationship between gestalt contact patterns and OCD symptoms. The low number of cases is a limitation in the evaluation of the data of the study. The inclusion of more people for future work may lead to a clearer understanding of the relationship. Analyzes made are correlations and T-test analyzes. But the evaluation of the mediating effect of symptoms may be considered for a better understanding of the effect of contact styles. Although age, sex, marital status and educational status of control group and patient group matched, variables such as temperament characteristics and duration of marriage could not be analyzed. In the following studies, it may be appropriate to include more detailed analysis considering both the drugs used, temperament characteristics and duration of marriage.

References

1. Eisen JL, Mancebo MA, Pinto A, Coles ME, Pagano ME, Stout R, et al. Impact of obsessive-compulsive disorder on quality of life. Compr Psychiatry. 2006;47(4):270-5.
2. Norberg MM, Calamari JE, Cohen RJ, Riemann BC. Quality of life in obsessive-compulsive disorder: an evaluation of impairment and a preliminary analysis of the ameliorating effects of treatment. Depress Anxiety. 2008;25(3):248-59.
3. American Psychiatric Association (APA). Diagnostic and Statistical Manual of Mental Disorders (DSM-5®). Philadelphia: APA; 2013.
4. Salkovskis PM. Obsessional-compulsive problems: a cognitive-behavioural analysis. Behav Res Ther. 1985;23(5):571-83.
5. Fisher PL, Wells A. How effective are cognitive and behavioral treatments for obsessive-compulsive disorder? A clinical significance analysis. Behav Res Ther. 2005;43(12):1543-58.
6. Foa EB, Liebowitz MR, Kozak MJ, Davies S, Campeas R, Franklin ME, et al. Randomized, placebo-controlled trial of exposure and ritual prevention, clomipramine, and their combination in the treatment of obsessive-compulsive disorder. Am J Psychiatry. 2005;162(1):151-61.
7. Whittal ML, Thordarson DS, McLean PD. Treatment of obsessive-compulsive disorder: cognitive behavior therapy vs. exposure and response prevention. Behav Res Ther. 2005;43(12):1559-76.
8. Stanley MA, Turner SM. Current status of pharmacological and behavioral treatment of obsessive-compulsive disorder. Behav Ther. 1995;26:163-86.
9. Wetterneck CT, Hart JM. Intimacy is a transdiagnostic problem for cognitive behavior therapy: Functional Analytical Psychotherapy is a solution. Int J Behav Consult Ther. 2012;7:167.
10. Newth S, Rachman S. The concealment of obsessions. Behav Res Ther. 2001;39(4):457-64.
11. Rachman S. Obsessions, responsibility and guilt. Behav Res Ther. 1993;31(2):149-54.
12. Doron G, Kyrios M, Moulding R. Sensitive domains of self-concept in obsessive-compulsive disorder (OCD): further evidence for a multidimensional model of OCD. J Anxiety Disord. 2007;21(3):433-44.
13. Shafran R, Watkins E, Charman T. Guilt in obsessive-compulsive disorder. J Anxiety Disord. 1996;10(6):509-16.
14. Shapiro LJ, Stewart ES. Pathological guilt: a persistent yet overlooked treatment factor in obsessive-compulsive disorder. Ann Clin Psychiatry. 2011;23(1):63-70.
15. Tallis F. Obsessions, responsibility and guilt: two case reports suggesting a common and specific aetiology. Behav Res Ther. 1994;32(1):143-5.
16. Mancini F, D'Olimpio F, Cieri L. Manipulation of responsibility in non-clinical subjects: does expectation of failure exacerbate obsessive--compulsive behaviors? Behav Res Ther. 2004;42(4):449-57.
17. Doron G, Moulding R, Kyrios M, Nedeljkovic M. Sensitivity of self-beliefs in obsessive compulsive disorder. Depress Anxiety. 2008;25(10):874-84.
18. Zhong C-B, Liljenquist K. Washing away your sins: threatened morality and physical cleansing. Science. 2006;313(5792):1451-2.
19. Reuven O, Liberman N, Dar R. The effect of physical cleaning on threatened morality in individuals with obsessive-compulsive disorder. Clin Psychol Sci. 2014;2:224-9.
20. Fergus TA, Valentiner DP, McGrath PB, Jencius S. Shame- and guilt--proneness: relationships with anxiety disorder symptoms in a clinical sample. J Anxiety Disord. 2010;24(8):811-5.
21. Rachman S. Unwanted intrusive images in obsessive compulsive disorders. J Behav Ther Exp Psychiatry. 2007;38(4):402-10.
22. Tangney JP, Wagner P, Gramzow R. Proneness to shame, proneness to guilt, and psychopathology. Erratum: Journal of Abnormal Psychology 1992 Nov;101(4):738. J Abnorm Psychol. 1992;101(3):738-8.
23. Kabat-Zinn J. Mindfulness-based interventions in context: Past, present, and future. Clinical Psychology: Science and Practice. 2003;10:144-56.
24. Gaines J, Perls FS. Fritz Perls: Here and now. Millbrae, CA; 1979.
25. Akkoyun F. Gestalt terapi. Ankara: Nobel Yayın Dağım; 2001. p. 85-9.
26. Joyce P, Sills C. Skills in Gestalt Counselling & Psychotherapy. London: SAGE; 2001.
27. Latner J. This is the speed of light: field and systems theories in Gestalt therapy. Gestalt J. 1983;6:1-20.
28. Houston G. Brief Gestalt Therapy. SAGE; 2003.
29. Lee RG, Wheeler G. Self and shame: A new paradigm for psychotherapy. The Voice of Shame: Silence and Connection in Psychotherapy. San Francisco: Jossey Bass. 1996. p. 48.
30. van Baalen D. Gestalt Therapy and Bipolar Disorder. Gestalt Rev. 2010;14:71-88.
31. Seligman LW, Reichenberg LW. Theories of Counseling and Psychotherapy: Systems, Strategies, and Skills MyLab Counseling Without Pearson eText – Access Card Package. London: Pearson Education; 2015.
32. Ellison JA, Greenberg LS, Goldman RN, Angus L. Maintenance of gains following experiential therapies for depression. J Consult Clin Psychol. 2009;77(1):103-12.
33. Williams L. Making contact with the self-injurious adolescent: Borderline personality disorder, Gestalt therapy, and dialectical behavioral therapy interventions. Gestalt Rev. 2010;14:250-74.
34. Sharf RS. Theories of Psychotherapy & Counseling: Concepts and Cases. Boston, MA: Cengage Learning; 2015.
35. Pfluger I. Gestalt approaches to working with clients presenting with bulimia. Gestalt Journal of Australia and New Zealand. 2014;10:60.
36. Arnfred SMH. Gestalt therapy for patients with schizophrenia: A brief review. Gestalt Rev. 2012;16:53.
37. Siampani K. Incorporating sandplay therapy into gestalt therapy in the treatment of dementia. Gestalt Rev. 2013;17:35.
38. Yorgun A, Voltan-Acar N. The Practicality of Reality Therapy in Turkish Culture: An Analytical Overview. Eğitim ve Bilim. 2014;39(175).
39. Voltan-Acar N. Ne kadar farkındayım?: Gestalt terapi. Babil Yayıncılık; 2004.
40. Goodman WK, Price LH, Rasmussen SA, Mazure C, Fleischmann RL, Hill CL, et al. The Yale-Brown Obsessive Compulsive Scale. I. Development, use, and reliability. Arch Gen Psychiatry. 1989;46(11):1006-11.
41. Goodman WK, Price LH, Rasmussen SA, Mazure C, Delgado P, Heninger GR, et al. The Yale-Brown Obsessive Compulsive Scale. II. Validity. Arch Gen Psychiatry. 1989;46(11):1012-6.
42. Karamustafalıoğlu KO, Ücısık AM, Ulusoy M, Erkmen H. Yale-Brown obsesyon-kompulsiyon derecelendirme ölçeği'nin geçerlilik ve güvenilirlik çalışması. Savaş Ofset. 1993:33.
43. Sanavio E. Obsessions and compulsions: the Padua Inventory. Behav Res Ther. 1988;26(2):169-77.
44. van Oppen P. Obsessions and compulsions: dimensional structure, reliability, convergent and divergent validity of the Padua Inventory. Behav Res Ther. 1992;30(6):631-7.
45. Beşiroğlu L, Ağargün MY, Boysan M, Eryonucu B, Gulec M, Selvi Y. Obsesif-kompulsif belirtilerin değerlendirilmesi: Padua Envanteri'nin Türk toplumunda geçerlik ve güvenilirliği. Türk Psikiyatri Dergisi. 2005;16:179-89.
46. Aktaş CG, Daş C. Geştalt Temas Biçimleri Yeniden Düzenlenmiş Formunun Türk örnekleminde faktör yapısı, geçerliliği ve güvenirliği. Temas Gestalt Terapi Dergisi. 2002;1:83-110.
47. Kudiaki Ç, Sezgin N. An examination of Gestalt contact styles, anger and anxiety levels of headache and non headache groups (Turkish). J Clin Psychiatry. 2018;21:68-78.
48. Kepner JI. Body process: A gestalt approach to working with the body in psychotherapy. Santa Cruz, CA: Gestalt Press; 2014.
49. Kepner JI. Healing tasks: Psychotherapy with adult survivors of childhood abuse. New York: Gestalt Press; 2013.
50. Mann D. Gestalt Therapy: 100 Key Points and Techniques. Abingdon: Routledge; 2010.
51. Chan F, Berven NL, Thomas KR. Counseling Theories and Techniques for Rehabilitation and Mental Health Professionals. 2nd ed. New York, NY: Springer Publishing Company; 2015.
52. Gabbard GO. Psychoanalytically informed approaches to the treatment of obsessive-compulsive disorder. Psychoanalytic Inquiry. 2001;21:208-21.
53. Pollock C, Andrews G. Defense styles associated with specific anxiety disorders. Am J Psychiatry. 1989;146(11):1500-2.
54. Cüceloğlu D. İnsan ve davranışı. Remzi Kitabevi; 2015.
55. Balkaya F, Tuğrul C. Üniversite öğrencilerinde temas biçimlerinin öfke ve anksiyete ile ilişkisi. Yayınlanmamış Doktora Tezi Ankara Üniversitesi, Sosyal Bilimler Enstitüsü, Ankara; 2006.
56. Jones-Smith E. Theories of Counseling and Psychotherapy: An Integrative Approach. London: SAGE Publications; 2011.

The effect of antidepressant treatment on the HPA axis, changes in depression score and serum levels of TNF-α in depressed infertile women

Sedigheh Keshavarz[1]
https://orcid.org/0000-0001-8603-1227

Bahar Morshed-Behbahani[2]
https://orcid.org/0000-0002-8528-1336

Mohammad Ebrahim Parsanezhad[3]
https://orcid.org/0000-0002-0925-6374

Ahmad Ghanizadeh[4]
https://orcid.org/0000-0001-7397-7646

Mehrap Sayadi[5]
https://orcid.org/0000-0003-2575-790X

Marzieh Akbarzadeh[6]
https://orcid.org/0000-0002-4491-2437

Received: 02/03/2019 – **Accepted:** 09/28/2019

DOI: 10.1590/0101-60830000000222

[1] Department of Midwifery, School of Nursing and Midwifery, Bushehr Province University of Medical Sciences, Bushehr, Iran.
[2] Community Based Psychiatric Care Research Center, Department of Midwifery, School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran.
[3] Department of Gynecology and Obstetrics, Medical School, Shiraz University of Medical Sciences, Shiraz, Iran.
[4] Department of Psychiatry, Research Center for Psychiatry and Behavioral Sciences, Hafez Hospital, Shiraz University of Medical Sciences, Shiraz, Iran.
[5] Department of Biostatistics, Cardiovascular Research Center, Shiraz University of Medical Sciences, Shiraz, Iran.
[6] Maternal-Fetal Medicine Research Center, Department of Midwifery, School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran.

Abstract

Objectives: This study aimed to explore the effect of antidepressant treatment on the HPA axis, changes in depression score, and serum levels of TNF-α in depressed infertile women. **Methods:** In this randomized controlled trial research, 60 infertile women who had undergone *in vitro* fertilization (IVF) treatment with depression scores between 16-47 were divided into two groups. The intervention group with fluoxetine capsule was under treatment for two months before the embryo transfer, while the control group was given placebo. Depression score, serum levels of tumor necrosis factor alpha (TNF-α) as well as cortisol hormone levels were measured and recorded both before and after the intervention. The data were analyzed using SPSS version 21 software. **Results:** We analyzed the data related to 55 subjects who had undergone embryo transfer. 7 subjects in the intervention group and 3 in the control group got pregnant. We observed a significant decrease in the depression score ($p < 0/001$) and serum levels of cortisol ($p = 0/001$) in the intervention group. There was a significant increase in the serum levels of TNF-α in the intervention group ($p < 0/001$). There was a significant difference between the two groups in the number of pregnancies ($p = 0.04$). However, there was no statistical difference between them with regard to the number of harvested oocytes ($p = 0.174$). **Discussion:** Decrease in depression score and cortisol level, and an increase in the levels of TNF-α in the intervention group caused any changes in the number of oocytes in comparison with the control group. However, the number of pregnancies was larger in the intervention group.

Keshavarz S et al. / Arch Clin Psychiatry. 2020;47(1):7-12

Keywords: TNF-α, infertility, depression, HPA axis, treatment.

Introduction

Cytokines are small proteins that are released through white blood cells, especially macrophages or some tissues in response to stimulants[1]. Some cytokines such as interferon and tumor necrosis factor alpha (TNF-α) are of cytotoxic effects, while some of them like growth factors have no cytotoxic effect. Some others have a prominent role in reproduction, gonadal function, implantation, and miscarriage[2]. TNF-α factor is one of the cytokines that has certain anti-inflammatory effects and is evaluated as a necessary index in many inflammatory diseases to assess the patients' responses to treatment. There is a relationship between an increase in the production of this cytokine and a variety of diseases like rheumatoid arthritis, atherosclerosis, diabetes, obesity, etc.[3]. Depression is thought of as another disorder that causes an increase in TNF-α and the number of cytokines in a person. On the one hand, depression leads to the production of inflammatory cytokines by activating the immune system. However, the patient's immunes system is influenced by simultaneous activation of HPA axis[4]. An increase in the level of inflammatory cytokines in depressed people will cause disorders in the brain function which will ultimately lead to activation of the hypothalamus-pituitary-adrenal axis (HPA)[5-7]. Cortisol is released as a result of activation of this axis and this biomarker affects pregnancy establishment and egg quality just as TNF-α does[8-11]. It is because cortisol has a series of safety properties that can affect immunological conditions for implantation. In a study carried out in 2011 on 264 depressed infertile women undergoing IVF treatment, cortisol and norepinephrine hormones were measured in women's serum and follicular fluid. Higher pregnancy rates were reported in women with lower cortisol and norepinephrine levels[12]. According to Arslan's study, on the effect of TNF-α on pregnancy, TNF-α was significantly high in 60% (12 out of 20) of the women who had suffered from recurrent miscarriages; this shows the effect of this cytokine on the egg quality and lack of suitable implantation for the embryo[9].

For many reasons, infertility has created a stressful situation with a lot of pain and suffering which leads to depression. It has been reported that prevalence of depression symptoms among infertile women is twice as much as that in fertile women[13]. Prevalence of

Address for correspondence: Marzieh Akbarzadeh. Maternal-Fetal Medicine Research Center, Department of Midwifery, School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran. E-mail: marzieh.akhbar@gmail.com

depression and anxiety is high in women undergoing infertility treatment. 11 percent of these women suffer from major depression and 15 percent of them suffer from anxiety disorders[14]. As mentioned before, depression will cause disorders in the immune system and will, therefore, affect the chances of pregnancy. Thus, treating depression could help this group of women. Today, selective serotonin reuptake inhibitors (SSRI) such as fluoxetine are known as the most commonly used antidepressants among women of childbearing age and even pregnant women. The reason why these drugs are highly used is their appropriate therapeutic effect and very few side effects[15]. However, the effect of SSRIs on fertility and the ability to get pregnant has not been clearly specified[13]. According to the above mentioned points, Fluoxetine was used for depression treatment in this study, so that we could analyze its effect on the serum level of TNF-α, changes in the HPA axis and the level of depression in people and determine the potential effect of these 3 factors on the patients' pregnancy.

Methods

Patients and intervention

The present study was a randomized controlled trial research which investigated the effect of Fluoxetine anti-depressant in women suffering from depression as well as its effect on depression score, serum levels of TNF-α and its subsequent changes in the function of HPA axis and finally fertility rate after IVF. This study was done from March 2014 to February 2016 in the clinic of infertility treatment at Shiraz University of Medical Sciences and obtained the approval of the Ethics Committee of Shiraz University of Medical Sciences (cod: CT-P9370-7870). The patients having undergone IVF filled out Beck Depression Inventory (BDI) and those with depression scores between 16 and 47 were sampled and studied provided that they met the inclusion criteria. Then, they were examined by a psychiatrist who prescribed 20 milligrams of Fluoxetine every day for two months. All the patients had a complete physical examination, and were asked about their medical history; all the tests were analyzed, and demographic questionnaire was filled out by all of them. All the patients were informed of the methodology and the possible side effects and filled out a written consent. Inclusion criteria were as follows: 1. undergoing the first IVF; 2. not suffering from chronic diseases, esp. infectious diseases, endocrine diseases and cancer; 3. not being under medical treatment and not having undergone mental health counseling; and 4. having no history of drug abuse.

Exclusion criteria of the study were as follows: 1. patient's lack of willingness to continue cooperation; 2. suffering from the side effects of Fluoxetine; and 3. treatment cancellation. The number of samples was determined by a statistical consultant based on the expected reduction in the depression score after the intervention and also according to similar studies conducted by Hubertus Himmerich (2006) and Tuglu (2003)[16,17]. After calculating a 10 percent potential loss, in each group 30 women and altogether 60 infertile women suffering from depression were selected based on purpose-oriented approach. After sample size calculation, permuted block randomization was used to assign patients into two groups; A: treatment with Fluoxetine capsule, B: control group using placebo. We assigned the patients into two groups in a 1:1 ratio. Then, 15 blocks of 4 (example AABB...) were prepared, and the patients were consecutively assigned to the blocks until the sample size in each group was completed (Figure 1). Fluoxetine and placebo capsules were prescribed according to the specific code, so that the patient himself, the physician, the operating room personnel, and the IVF personnel ward did not know which group the patient belonged to. All patients began daily HMG injections on day 2 of the menstrual cycle and were referred again on day 6 for ultrasound and serum estradiol levels. HCG injection and subsequent oocyte retrieval were performed only in patients with more than 4 follicles over 17 mm in their ovaries. About 36 hours after hCG injection, oocyte retrieval was performed. At the same time, the sperm sample of the patient's husband was taken in the morning and processed in the laboratory and then fertilized with the egg in the designated culture medium. The embryos were then frozen for transfer to the next cycle by vitrification method. Ovarian stimulation, uterine preparation, and embryo transfer were performed

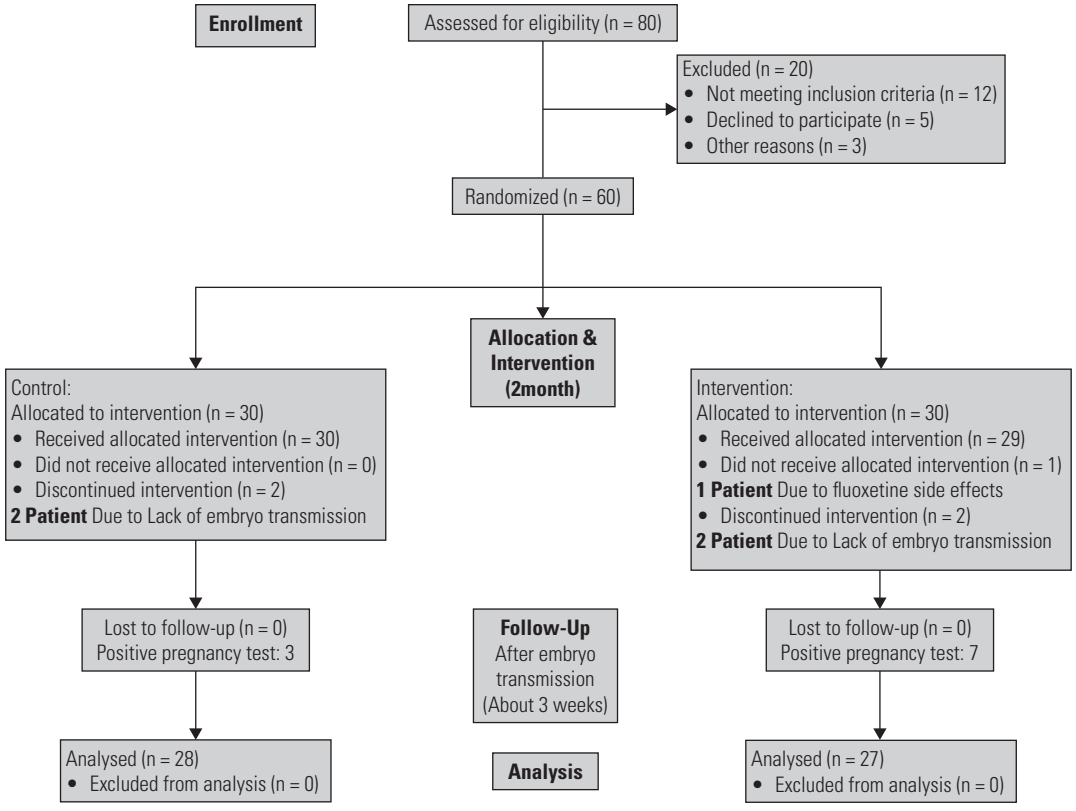


Figure 1. CONSORT flow diagram for sampling.

for all patients in the same manner. 55 patients (28 in control group and 27 in intervention group) were able to freeze the embryo for the transfer day. The researchers checked the quality of all the embryos; in grade A, the blastomeres were identical in size and there were no signs of fragmentation in them. In grade B, a number of the blastomeres were unequal in size and there were signs of fragmentation in 10% of them; Grades C and D were not transferred. Based on the embryo quality, the quality of all the transferable embryos were grades A or B and only one embryo was transferred.

The uterine preparation was done in the next cycle. The patient was taking 6 mg daily of estradiol pills from the second day of menstruation (2 mg estradiol pills Aburaihan Pharmacy Co., Tehran, Iran-three pills a day), to prepare their endometrium for transfer; on the 9th, 10th, or 11th days after the beginning of menstruation, the thickness of the endometrium in each patient was measured using transvaginal sonography. If the thickness of the uterine wall was more than 8 mm, the patient was administered an intramuscular injection of 100mg progesterone (50 mg progesterone ampules Aburaihan Pharmacy Co., Tehran, Iran – 2 ampules were administered); 2 days after the progesterone injection, the embryo was transferred. Embryo transfer was carried out guided by ultrasound sonography; the catheter was entered into the cervix and the embryo was transferred (this method is called ultrasound-guidance or catheter guidance). BhCG test was done on the patients two or three weeks after the embryo transfer and if the result of the test was positive, biochemical pregnancy was confirmed.

Data collection

The data of every individual's depression score were recorded on the day of the surgery both before and after the intervention, using Beck Depression Inventory (BDI). Blood samples were taken for TNF-α serum check and cortisol simultaneously with filling out Beck questionnaire before and after the intervention. The first blood test was done in laboratory and the second one was done in the operating room before the embryo transfer between 8 and 9 a.m. Each time, 5cc of blood was taken. The samples were centrifuged immediately and kept at -70 degrees. The obtained values were then recorded, using ELISA method.

Analyzed consequences

1. Changes in TNF-α factor; 2. Changes in the depression score; 3. Changes in the cortisol level; 4. Positive pregnancy test (biochemical pregnancy rate) in the groups; and 5. The number of harvested oocytes in each group. The serum levels of cortisol were measured by ELISA using a French BioMérieux kit in the serum, and used to measure TNF levels using the IBL ELISA kit (Human TNF-alpha), which was made in Ireland.

Statistical analysis

The data related to 55 patients under the study which had been obtained from demographic survey and clinical variables were recorded at the end of the treatment and IVF process in statistical analysis program and the following were done based on the objectives of statistical analysis study. T-test was used to analyze the difference between demographic data in the two groups; also, chi-square test was used to determine the difference between the two groups with regard to pregnancy, and paired t-test was used to determine the changes in variables before and after the intervention. SPSS software was used to analyze the data, and the significance level was considered to be 0.05.

Results

There were 60 participants in this study. After considering the loss of some participants (3 in the medicine group and 2 in the control group), 55 subjects remained in the study, 28 in the control group and 27 in the Fluoxetine group. 10 out of 55 subjects who did embryo transfer got pregnant (7 in the intervention group and 3 in the control group). Two groups in terms of demographic characteristics, third day hormones, and cause of infertility were not statistically significant before intervention and the two groups were homogeneous (Table 1).

Positive pregnancy outcome in this study was considered to be a positive pregnancy test. According to the results of T-test, there was no significant difference between the two groups in terms of age, BMI, duration of marriage, and duration of infertility (Table 2). Paired sample test was used both before and after the intervention to

Table 1. Demographic characteristics and examination of day 3 hormones and causes of infertility

		Fluoxetine (n = 27)	Control (n = 28)	P
		Mean (SD)	Mean (SD)	
Age (year)		30.47 (4.54)	30.43 (5.34)	**0.516**
BMI (kg/m^2)		25.06 (3.53)	26.61 (5.34)	**0.262**
Time of marriage (year)		8.08 (5.23)	8.26 (5.88)	**0.916**
Time of infertility (year)		5.60 (4.84)	5.82 (4.06)	**0.870**
FSH (third day)		6.07 (3.17)	6.31 (2.33)	**0.555***
LH (third day)		4.77 (2.67)	4.69 (3.94)	**0.340***
AMH (third day)		4.58 (3.68)	4.56 (3.68)	**0.919***
Est (third day)		61.83 (21.07)	56.49 (37.67)	**0.223***
Cause of infertility		(Percent)	(Percent)	
	Male	39.1%	34.8%	**0.182****
	Female	21.7%	47.8%	
	Both	17.4%	13.0%	
	Idiopathic	21.7%	4.3%	

* My Whitney Test. ** Fisher exact test.

Table 2. Demographic characteristics of the two groups (fluoxetine and controls)

	Fluoxetine (n = 27)	Control (n = 28)	P
	Mean (SD)	Mean (SD)	
Age (year)	30.47 (4.54)	30.43 (5.34)	**0.516**
BMI (kg/m^2)	25.06 (3.53)	26.61 (5.34)	**0.262**
Time of marriage (year)	8.08 (5.23)	8.26 (5.88)	**0.916**
Time of infertility (year)	5.60 (4.84)	5.82 (4.06)	**0.870**

analyze the changes in depression; as shown in Table 3, there was a significant decrease in the depression score in the intervention group.

As can be seen in the results of Paired t-test, there was a significant increase in the serum levels of TNF-α in the intervention group on the day of transfer. Paired t-test was also used to analyze the changes in cortisol both before and after the intervention. The results related to cortisol level in these two groups showed that there was a significant decrease in the cortisol serum level of the Fluoxetine group ($p = 0.001$). However, these changes were not observed in the control group ($p = 0.734$).

Seven participants in the Fluoxetine group and 3 in the control group got pregnant. According to the results of chi-square test, there was a significant statistical difference in the pregnancy rate between the control and intervention groups ($p = 0.04$), and the number of pregnancies in the fluoxetine group was twice as many as those in the control group. The two groups were also compared in terms of the average number of harvested oocytes. According to the results of T-test, there was no significant statistical difference between the average number of oocytes in the control and intervention groups (Table 4).

Discussion

In this study, we analyzed the level of depression in the two groups after taking fluoxetine (intervention group) and placebo (control group) for two months and noticed that there was a significant decrease in the depression score measured using Beck inventory in the intervention group. This result could lend credence to the good effect of SSRI on decreasing the level of depression[14]. With an increase in the prevalence of depression among women of childbearing age and especially infertile women, these drugs have been widely used as they have helped to decrease the depression score to a considerable extent[15]. In the studies done by Faramarzi in the years 2008 and 2013, there was a significant decrease in the infertile patients' depression score as a result of the administration of Fluoxetine[18,19].

In the present study, there was a significant increase in the levels of TNF-α after the intervention, possibly as a consequence of the significant decrease in serum cortisol levels in the intervention group, since cortisol inhibits TNF-α production. According to the Metaanalyses done by Dowlati and Liu in 2009 and 2011, depression affects the production of cytokines and increases the production of inflammatory factors, especially TNF-α and IL-6[20,21]. Based on a study done by Shen et al. in 2010, the number of proinflammatory cytokines in the patients suffering from depression was significantly larger than those in non-depressed ones. However, after the patients were treated with antidepressants, there was a decrease in the level of these cytokines, but it was stiller larger than those in the non-depressed subjects[4]. According to Liu (2011), not only does the administration of Fluoxetine decrease the serum levels of TNF-α, but also it decreases the level of its mRNA[22]. The difference between the results of this study and the other mentioned studies could be due to the fact that the level of inflammatory cytokines causes disorder in the brain function, as a result of which there will be changes in the function of HPA system[21,23] and thus changes in the cortisol level. Accordingly, hypothalamus releases corticotropin releasing hormone (CRH) and increases the release of adrenocorticotropin (ACTH) from pituitary gland. As a result, cortisol is released from the adrenal gland[16]. An increase in the cortisol level leads to a decrease in TNF-α if there is negative feedback. Meanwhile, if there is a decrease in cortisol for any reason, there is an increase in TNF-α level once again[24-26]. As mentioned in the results of the study, there was a significant decrease in the cortisol level in the intervention group after the intervention, which was thought of as a stimulant for increasing TNF-α levels in people suffering from depression. In different studies, cortisol has been considered as the most important negative feedback signal for controlling cytokines and a suppressor of the production of cytokines[27,28]. A study done by Piletz in 2009 also indicated an increase in TNF-α after depression treatment[29]. In this study, venlafaxine and duloxetine were used and an increase in the TNF-α level in this study could be due to the intrinsic anti-flammatory effects of norepinephrine on the immune cells. Different results were reported in studies done by Eller on depressed people in 2008 and 2009. In these studies, people underwent various antidepressant treatments and there was only a decrease in the depression score, but no changes were observed in the TNF-α level[30,31]. Jazayeri (2010) studied the changes in HPA axis and cytokines after administration of fluoxetine on depressed people and analyzed the cortisol serum level, IL-6 and IL-1β. No changes were observed in the level of cytokines, but there was a significant decrease in the cortisol level after treatment[32]. In a study done by Pan *et al.*, in which Icariin was used as an antidepressant, the TNF-α level showed a negative growth in some doses of the drug (75 mg) that had caused a decrease in the cortisol serum levels. On the other hand, no changes were observed in the TNF-α levels or cortisol level in lower doses of the drug (35 mg). Accordingly, if antidepressants lead to effective successful treatment and a decrease in the cortisol level, there will be an increase in TNF-α[33].

Table 3. Depression score, serum levels of TNF-α and cortisol level changes in both groups before and after intervention

	$Depression_1$ Mean (SD)	$Depression_2$ Mean (SD)	P
Fluoxetine (n = 27)	24.95 (7.98)	18.52 (9.63)	**p < 0.001**
Control (n = 28)	22.16 (8.69)	19.70 (7.52)	**0.274**
	$TNF\text{-}\alpha_1$ Mean (SD)	$TNF\text{-}\alpha_2$ Mean (SD)	
Fluoxetine (n = 27)	71.98 (6.22)	360.17 (47.86)	**p < 0.001**
Control (n = 28)	85.32 (7.28)	109.49 (32.58)	**0.106**
	$Cortisol_1$ Mean (SD)	$Cortisol_2$ Mean (SD)	
Fluoxetine (n = 27)	24.89 (9.98)	16.17 (6.32)	**0.001**
Control (n = 28)	18.23 (8.09)	17.65 (8.37)	**0.734**

$Depression_1$, $TNF\text{-}\alpha_1$, $Cortisol_1$: before intervention.
$Depression_2$, $TNF\text{-}\alpha_2$, $Cortisol_2$: after intervention on the day of embryo transfer to the uterus.

Table 4. Difference between oocytes taken and pregnancy rate in two groups

	Pregnant, N (%)	Not pregnant, N (%)	P	Number of Oocyte Mean (SD)	P
Fluoxetine (n = 27)	7 (25.92)	20 (74.07)	**0.04**	16.04 (7.97)	**0.160**
Control (n = 28)	3 (10.71)	25 (92.59)		13.0 (6.36)	

There are 3 hypotheses on the effect of TNF-α on oocytes: 1. TNF-α affects the oocyte during its maturation and causes disorders in cleavage stage; 2. TNF-α on the embryo after fertilization prevents it from growing and turning into blastocyst; and 3. TNF-α increases chances of apoptosis in blastomeres[34]. According to these hypotheses, TNF-α may not affect the number of oocytes and embryo implantation, but it increases the chances of early destruction of the embryo and miscarriage. According to a study done by Soto (2003) on the effect of TNF-α on fertility in cattle, TNF-α caused an increase in apoptosis and destruction of the embryo at the beginning of pregnancy although it had no effect on the oocyte maturation and fertilization[34]. In the present study, there was no significant difference in the two groups as to the number of oocytes, and an increase in TNF-α did not affect the number of oocytes either. According to a study done by Brogin Moreli (2012), the effect of TNF-α is shown through its impact on cell proliferation, differentiation and apoptosis in the tissue and disorders in these would lead to early loss of the fetus[35]. In other words, if faced with TNF-α, there may be no difference in the number of oocytes and positive pregnancy test among the people. However, the embryo does have the ability to replicate and grow well after pregnancy, which could lead to early loss of pregnancy. In the present study, the two groups were also compared in terms of pregnancy. Accordingly, the number of pregnancies in the Fluoxetine group was twice as many as that in the control group and also an increase in TNF-α did not affect the pregnancy rate. Unlike our results, the findings of the studies done by Xu *et al.* (2018) and Boudjenah *et al.* (2014) showed that an increase in the TNF-α serum levels caused disorders in the embryo implantation, as a result of which there was a decrease in pregnancy rate during IVF[36,37]. According to Lee *et al.*, an increase in the TNF-α level decreases the quality, but not the number of oocytes and there is no relationship between its level and pregnancy[8].

On the other hand, it could be concluded that a decrease in cortisol increased the pregnancy rate because the results of the studies done on this field have shown that cortisol changes the immunological conditions of the uterus and prevents the embryo implantation[12,38]. According to a study done by An *et al.* (2013), low levels of this hormone on the egg harvesting day increased the chances of the patients' pregnancy[38]. However, according to a study done by Csemiczky *et al.* (2000), there was no difference between pregnant and non-pregnant women in the cortisol level[39].

Conclusion

The findings of the study showed that there was a significant decrease in the depression score of the intervention group as a result of taking fluoxetine. There was also a decrease in the cortisol serum levels that caused an increase in TNF-α due to the effect of negative feedback. However, an increase in the serum level of this cytokine did not have a negative effect on the number of oocytes and patients' pregnancy. The reason behind it could be the effect of this cytokine on the embryo opoptosis and an increase in the chances of miscarriage, not a decrease in pregnancy. On the other hand, a decrease in cortisol in the fluoxetine group provided the immunological conditions of the uterus for pregnancy and there was a significant increase in the number of pregnancies in the intervention group. There was no difference between the groups in terms of the number of harvested oocytes. We recommend that there should be an increase in the number of samples in future studies so that we can analyze the results more precisely and reach more certain conclusions.

Strengths and limitations

The most important limitation of this study was the small of number of depressed infertile patients that were willing to participate. Because of cultural, mental and family conditions, this group does not usually tend to take medicines, except for those related to IVF cycles, which led to a lot of limitations on our study. We recommend hperforming more precise and certain analysies through more sampling of these specific cases. Moreover, because of the TNF-α's effects on increasing the rate of miscarriage, we suggest increasing the follow-up procedures in these patients to also evaluate this rate in future studies.

The strength of this study lies in the simultaneous analysis of the changes in the HPA axis through cortisol, changes in TNF-α cytokine after the intervention, and treating patients and continuing the follow-ups until they get fertile. However, the above-mentioned points have rarely been analyzed simultaneously in other studies.

Acknowledgements

The study is a part of the thesis by Sedigheh Keshavarz, that obtained the approval of the ethics committee of Shiraz University of Medical Sciences (cod: CT-P9370-7870) with the code of IRCT2014031116911n2.

The authors would like to thank Shiraz University of Medical Sciences, Shiraz, Iran, Mother and Child Infertility Center, and also Center for Development of Clinical Research of Nemazee Hospital and Dr Nasrin Shokrpour for editing the manuscript.

References

1. Wilczynski JR. Cancer and pregnancy share similar mechanisms of immunological escape. Chemotherapy. 2006;52(3):107-10.
2. Naz RK, Butler A, Witt BR, Barad D, Menge AC. Levels of interferon-γ and tumor necrosis factor-α in sera and cervical mucus of fertile and infertile women: implication in infertility. J Reprod Immunol. 1995;29(2):105-17.
3. Parameswaran N, Patial S. Tumor necrosis factor-α signaling in macrophages. Crit Rev Eukaryot Gene Expr. 2010;20(2):87-103.
4. Shen Y, Lu P, Wei L, Hu X, Chen W. Fluoxetine treatment for major depression decreases the plasma levels of cytokines. Afr J Biotechnol. 2010;9(43):7346-51.
5. Bierhaus A, Wolf J, Andrassy M, Rohleder N, Humpert PM, Petrov D, et al. A mechanism converting psychosocial stress into mononuclear cell activation. Proc Nat Acad Sci. 2003;100(4):1920-5.
6. Pavlov VA, Tracey KJ. The cholinergic anti-inflammatory pathway. Brain Behav Immun. 2005;19(6):493-9.
7. Shaked I, Meerson A, Wolf Y, Avni R, Greenberg D, Gilboa-Geffen A, et al. MicroRNA-132 potentiates cholinergic anti-inflammatory signaling by targeting acetylcholinesterase. Immunity. 2009;31(6):965-73.
8. Lee KS, Joo BS, Na YJ, Yoon MS, Choi OH, Kim WW. Relationships between concentrations of tumor necrosis factor-alpha and nitric oxide in follicular fluid and oocyte quality. J Assist Reprod Genet. 2000;17(4):222-8.
9. Arslan E, Çolakoğlu M, Çelik Ç, Gezginç K, Acar A, Çapar M, et al. Serum TNF-α, IL-6, lupus anticoagulant and anticardiolipin antibody in women with and without a past history of recurrent miscarriage. Arch Gynecol Obstet. 2004;270(4):227-9.
10. Hashemi S, Simbar M, Ramezani-Tehrani F, Shams J, Majd HA. Anxiety and success of in vitro fertilization. Eur J Obstet Gynecol Reprod Biol. 2012;164(1):60-4.
11. Li W, Newell-Price J, Jones G, Ledger W, Li T. Relationship between psychological stress and recurrent miscarriage. Reprod Biomed Online. 2012;25(2):180-9.
12. An Y, Wang Z, Ji H, Zhang Y, Wu K. Pituitary-adrenal and sympathetic nervous system responses to psychiatric disorders in women undergoing in vitro fertilization treatment. Fertil Steril. 2011;96(2):404-8.
13. Akioyamen LE, Minhas H, Holloway AC, Taylor VH, Akioyamen NO, Sherifali D. Effects of depression pharmacotherapy in fertility treatment on conception, birth, and neonatal health: a systematic review. J Psychosom Res. 2016;84:69-80.
14. Cesta CE, Viktorin A, Olsson H, Johansson V, Sjölander A, Bergh C, et al. Depression, anxiety, and antidepressant treatment in women: association with in vitro fertilization outcome. Fertil Steril. 2016;105(6):1594-602. e3.
15. Kaihola H, Yaldir FG, Hreinsson J, Hörnaeus K, Bergquist J, Olivier JD, et al. Effects of fluoxetine on human embryo development. Front Cell Neurosci. 2016;10:160.
16. Himmerich H, Binder EB, Künzel HE, Schuld A, Lucae S, Uhr M, et al. Successful antidepressant therapy restores the disturbed interplay between TNF-α system and HPA axis. Biol Psychiatry. 2006;60(8):882-8.

17. Tuglu C, Kara SH, Caliyurt O, Vardar E, Abay E. Increased serum tumor necrosis factor-alpha levels and treatment response in major depressive disorder. Psychopharmacology. 2003;170(4):429-33.
18. Faramarzi M, Pasha H, Esmailzadeh S, Kheirkhah F, Heidary S, Afshar Z. The effect of the cognitive behavioral therapy and pharmacotherapy on infertility stress: a randomized controlled trial. Int J Fertile Steril. 2013;7(3):199-206.
19. Faramarzi M, Alipor A, Esmaelzadeh S, Kheirkhah F, Poladi K, Pash H. Treatment of depression and anxiety in infertile women: cognitive behavioral therapy versus fluoxetine. J Affect Disord. 2008;108(1-2):159-64.
20. Dowlati Y, Herrmann N, Swardfager W, Liu H, Sham L, Reim EK, et al. A meta-analysis of cytokines in major depression. Biol Psychiatry. 2010;67(5):446-57.
21. Liu Y, Ho RC-M, Mak A. Interleukin (IL)-6, tumour necrosis factor alpha (TNF-α) and soluble interleukin-2 receptors (sIL-2R) are elevated in patients with major depressive disorder: a meta-analysis and meta--regression. J Affect Disord. 2012;139(3):230-9.
22. Liu D, Wang Z, Liu S, Wang F, Zhao S, Hao A. Anti-inflammatory effects of fluoxetine in lipopolysaccharide (LPS)-stimulated microglial cells. Neuropharmacology. 2011;61(4):592-9.
23. Hannestad J, DellaGioia N, Bloch M. The effect of antidepressant medication treatment on serum levels of inflammatory cytokines: a meta--analysis. Neuropsychopharmacology. 2011;36(12):2452-9.
24. Kapcala LP, Chautard T, Eskay RL. The protective role of the hypothalamic-pituitary-adrenal axis against lethality produced by immune, infectious, and inflammatory stress. Ann N Y Acad Sci. 1995;771(1):419-37.
25. Tilders FJ, DeRuk RH, Van Dam AM, Vincent VA, Schotanus K, Persoons JH. Activation of the hypothalamus-pituitary-adrenal axis by bacterial endotoxins: routes and intermediate signals. Psychoneuroendocrinology. 1994;19(2):209-32.
26. Silverman MN, Pearce BD, Biron CA, Miller AH. Immune modulation of the hypothalamic-pituitary-adrenal (HPA) axis during viral infection. Viral Immunol. 2005;18(1):41-78.
27. Arzt E, Kovalovsky D, Igaz LM, Costas M, Plazas P, Refojo D, et al. Functional cross-talk among cytokines, T-cell receptor, and glucocorticoid receptor transcriptional activity and action. Ann N Y Acad Sci. 2000;917(1):672-7.
28. Besedovsky H, Del Rey A. The cytokine-HPA axis feed-back circuit. Z Rheumatol. 2000;59 Suppl 2:II/26-30.
29. Piletz JE, Halaris A, Iqbal O, Hoppensteadt D, Fareed J, Zhu H, et al. Pro-inflammatory biomakers in depression: treatment with venlafaxine. World J Biol Psychiatry. 2009;10(4):313-23.
30. Eller T, Vasar V, Shlik J, Maron E. Pro-inflammatory cytokines and treatment response to escitalopram in major depressive disorder. Prog Neuropsychopharmacol Biol Psychiatry. 2008;32(2):445-50.
31. Eller T, Vasar V, Shlik J, Maron E. Effects of bupropion augmentation on pro-inflammatory cytokines in escitalopram-resistant patients with major depressive disorder. J Psychopharmacol. 2009;23(7):854-8.
32. Jazayeri S, Keshavarz SA, Tehrani-Doost M, Djalali M, Hosseini M, Amini H, et al. Effects of eicosapentaenoic acid and fluoxetine on plasma cortisol, serum interleukin-1beta and interleukin-6 concentrations in patients with major depressive disorder. Psychiatry Res. 2010;178(1):112-5.
33. Pan Y, Zhang WY, Xia X, Kong LD. Effects of icariin on hypothalamic--pituitary-adrenal axis action and cytokine levels in stressed Sprague--Dawley rats. Biol Pharm Bull. 2006;29(12):2399-403.
34. Soto P, Natzke R, Hansen P. Actions of tumor necrosis factor-alpha on oocyte maturation and embryonic development in cattle. Am J Reprod Immunol. 2003;50(5):380-8.
35. Brogin Moreli J, Cirino Ruocco AM, Vernini JM, Rudge MVC, Calderon IMP. Interleukin 10 and tumor necrosis factor-alpha in pregnancy: aspects of interest in clinical obstetrics. ISRN Obstet Gynecol. 2012;2012.
36. Xu B, Zhou M, Wang J, Zhang D, Guo F, Si C, et al. Increased AIF-1--mediated TNF-α expression during implantation phase in IVF cycles with GnRH antagonist protocol. Hum Reprod. 2018;33(7):1270-80.
37. Boudjenah R, Molina-Gomes D, Torre A, Boitrelle F, Taieb S, Dos Santos E, et al. Associations between Individual and combined polymorphisms of the TNF and VEGF genes and the embryo implantation rate in patients undergoing in vitro fertilization (IVF) programs. PloS One. 2014;9(9):e108287.
38. An Y, Sun Z, Li L, Zhang Y, Ji H. Relationship between psychological stress and reproductive outcome in women undergoing in vitro fertilization treatment: psychological and neurohormonal assessment. J Assist Reprod Genet. 2013;30(1):35-41.
39. Csemiczky G, Landgren BM, Collins A. The influence of stress and state anxiety on the outcome of IVF-treatment: Psychological and endocrinological assessment of Swedish women entering IVF-treatment. Acta Obstet Gynecol Scand. 2000;79(2):113-8.

Long-term posttraumatic stress disorder in mine workers after a coalmining disaster

Makbule Neslisah Tan[1]
https://orcid.org/0000-0002-3262-7815

Vildan Mevsim[1]
https://orcid.org/0000-0002-3546-9146

İsmail Topal[2]
https://orcid.org/0000-0002-5483-4284

Çigdem Alkan[1]
https://orcid.org/0000-0002-4369-6576

Received: 02/13/2019 – **Accepted:** 09/02/2019
DOI: 10.1590/0101-60830000000223

[1] *Dokuz Eylul Universitesi – Family Medicine Izmir, Turkey.*
[2] *Tek Ilke Iş Sağliği ve Güvenliği Eğitim Kurumu, Izmir, Turkey.*

Abstract

Background: A coalmine disaster has occurred in Turkey on 13 May 2014, which caused the death of 301 miners. **Objective:** This study aimed to determine the prevalence of posttraumatic stress disorder (PTSD) symptoms and the risk factors for PTSD among mine workers, 2 years after the coalmining disaster. **Methods:** This was a cross-sectional survey conducted between June 2016 and July 2016 among mine workers who were the employees of either the mine where the accident occurred or three other mines in the same area. Sociodemographic data form and PTSD Symptom-Scale Self-Report (PSS-SR) were used to collect data. **Results:** 672 mine workers participated in the study. At the time of the accident, 23.7% (n = 159) of them were in the mine where the accident occurred. The mean score on total PSS-SR was 4.27 (SD: ±4.49). Eighteen (2.7%) participants screened positive for PTSD. Logistic regression analysis revealed the significant risk factors for PTSD are: being single/divorced/widowed, having a chronic disease, having a family history of psychiatric illness and previously experiencing traumatic events more than one. **Discussion:** Coalmining workers have considerably high prevalence rate of PTSD symptoms after a coalmining disaster. Assessing PTSD and associated risks is important for preventive mental health services.

Tan MN et al. / Arch Clin Psychiatry. 2020;47(1):13-8

Keywords: Posttraumatic stress disorder, coalmining disaster, risk factors.

Introduction

Occupational health and safety is a global concern, with millions of people getting injured or losing their lives owing to work accidents every year[1]. The rate of occupational accidents in Turkey is relatively high, although it has considerably decreased over the past four decades. According to the data of the International Labor Organization for Turkey (ILO), approximately 700-1,700 people have lost their lives every year since 1995 because of work accidents. Assessment of the distribution of the death rates according to the major sectors showed that the mining sector holds an important place among workplace deaths[2], and the area within the mining sector that involves the highest risk is coal mining. Underground coal mining is among top-ranking occupations in terms of deaths and accidents per worker[3]. It is stated that, the fatal occupational injury rate in underground coal mining has been six times higher than that in all private industry[4].

Mining accidents are potentially traumatic events (PTEs) that not only threaten the physical well-being of the individual but also have the potential to cause serious mental health problems such as posttraumatic stress disorder (PTSD)[5]. According to the DSM-IV, the core features of PTSD include a PTE and a configuration of symptoms. The disorder's criterion symptoms are defined as a state of increased alertness in a person, which emerges following a PTE, accompanied by the avoidance of stimuli reminding or evoking of the trauma, and the person reliving the PTE through dreams and flashbacks[6]. The duration of the symptoms presentation should be at least 1 month[7]. Symptoms may persist for more than 30 days after the PTE; alternatively, they can appear months or even years after the accident[5,8]. Surviving miners are not the only people affected by mining accidents. Although the extent to which individuals are affected tends to differ, other people and groups impacted by these accidents are the family members, relatives, neighbors of the deceased, surviving workers, and even the citizens who follow the PTEs from the media[9].

The results of studies on the prevalence of PTSD tend to vary depending on various factors such as the time period of the study, the nature of the trauma, the differences among the subjects, and the diagnostic tools used. A retrospective study on the mining industry in Africa conducted between 2006 and 2010 showed that the overall prevalence of PTSD was 0.09%[5].

Studies investigating the relationship between PTEs and PTSD development indicate that old age, female sex, and being a member of a low social stratum are risk factors for PTSD development. In addition, psychological factors such as guilt, poor coping ability, and comorbid psychiatric conditions represent other risk factors for PTSD development[10,11]. The severity, duration, and proximity of an individual's exposure to a PTE are the most important factors affecting the likelihood of PTSD development[5].

Although Turkey is a country that has frequently experienced mining accidents throughout its history, no studies have been conducted on the psychological impact of these accidents on people. In fact, these traumatic accidents can adversely affect the psychosocial well-being of mine workers, and consequently reduce their job performance and productivity[2,5,12].

On 13 May 2014, an occupational mining accident occurred in a mine located in the western region of Turkey, resulting in the death of 301 miners, which was the highest number of deaths in an occupational accident ever recorded in the country's history[13]. A review of PTSD studies reported in the literature showed that these studies

Address for correspondence: Makbule Neslisah Tan. Dokuz Eylul Universitesi – Family Medicine. Mithatpasa Street Narlıdere Izmir 35210, Turkey. E-mail: drnesli293@hotmail.com

have heterogeneity in their sociodemographic variables[14], and that they were mostly conducted without considering the trauma type and population[5,10]. This study aimed to determine the prevalence of PTSD symptoms and the risk factors for PTSD among mine workers working in mines located in an area that has previously experienced accidents.

Methods

Participants

This is a cross-sectional, descriptive and quantitative study. The study sample comprised trainees aged >18 years who had participated in the occupational health and safety training at the Occupational Health and Safety Training Center between June 2016 and July 2016, and who were among the employees of either the mine where the accident of 13 May 2014 occurred or three other mines in the same area. Written informed consent was obtained from the participants. Participants were included into the study on a voluntary basis and individuals who did not work as a mine worker for the located mines at "the time of the mining accident" were excluded. Illiterate participants were assisted by the researchers when filling their forms. No psychiatric interview was conducted with the participants.

Ethical approval

The study was approved by the Dokuz Eylül University Faculty of Medicine's Ethics Committee for Non-Interventional Studies on 12 May 2016, with the protocol number 2016/13-44.

Data collection tools

Sociodemographic and Clinical Data Collection Form: This form was prepared by the researchers to collect information regarding the sociodemographic and clinical features of the participants. The form includes questions about participants' age, marital status, education level, household income, presence of comorbid chronic diseases, current and past medical history of mental illness, family history of psychiatric illness, previous traumatic experience, occupational knowledge in the field of mining, and the outcomes of the accident. The participants were asked whether they are currently diagnosed with any chronic or psychiatric illness. They were asked to answer this question as "yes" or "no" and (if "yes") to give the name of the diagnosis. These diagnoses are current condition diagnoses and do not include past diagnoses.

Traumatic Experiences List: The Traumatic Experiences List comprising 12 items was used to investigate PTEs experienced in the past. The trauma checklist is included in the The Posttraumatic Diagnostic Scale developed by Foa *et al.*[15] and adapted for the Turkish sample[16]. The participants were asked whether they have experienced or witnessed each of these events.

Posttraumatic Stress Disorder Symptoms Scale-Self-Reported (PSS-SR): This scale was developed by Foa *et al.* (1993) to screen PTSD symptoms within the normal population in accordance with the criteria defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)[17]. PSS-SR is a four-point Likert-type self-reported scale comprising 17 items. The Likert scale covers three aspects: reliving, avoidance, and arousal. Each item is scored between 0-3 (0: None, 3: ≥ per week-almost always), and the total score is obtained by summing of item scores. The maximum score that can be obtained from the scale is 51. A cut-off value of 14 points on the PSS-SR was reported to have a sensitivity of 0.83 and a specificity of 0.71[18]. Moreover, different studies have determined the cut-off value to be 14[19]. A higher score indicates increased PTSD symptom severity. The Turkish validity and reliability study of the scale was conducted by Aydın *et al.* (2012), and the internal consistency coefficient was reported to be 0.90 for the entire scale[20]. Participants were asked to rate problems they were bothered by in the past month 'in relation to the mine accident' on the scale.

To address hazards and prevent injuries and illnesses among mine workers, The Regulations of the Ministry of Labour and Social Security of Turkey on occupational health and safety in mines were published on November 2013. The regulation issued mandatory safety and health training for any worker employed at a mine, to determine the minimum health and safety requirements for works related to mining[21]. The questionnaires were distributed to the participants during the training program, before starting training and collected when completed.

Statistical analysis

The obtained data were evaluated using Statistical Package for Social Sciences for Windows 22.0 (IBM Corp.; Armonk, NY, USA). Quantitative variables were shown as mean ± SD (standard deviation), whereas categorical variables were shown as numbers and percentages. Chi-square test was used to evaluate the relationships between categorical variables, and independent samples *t*-test was used to determine whether there was a significant difference between the mean scores of the groups. Variables were examined at 95% confidence interval, and $P < 0.05$ was considered statistically significant. Risk factors for PTSD were examined initially using bivariate analysis based on socio-demographic characteristics, clinical characteristics and disaster experience. To further determine risk factors for PTSD, the variables that had p values < 0.05 in bivariate analysis were further examined in logistic regression models and odss ratios (OR) with 95% confidence interval (95% CI) were obtained.

Results

Socio-demographical and clinical characteristics

Of 699 trainees participated in the occupational health and safety training, 27 were excluded: 23 trainess were not mine workers at each of the four mines at "the time of the mining accident", 2 trainees declined to participate stating that they were "not interested", 2 trainees had missing data points. Thus, a sample size of 672 trainees was used for analysis.

All of them were males, with the mean age of 33,83 ± 7,45 years (range: 19-56 years). Table 1 shows a comparison of the prevalence of PTSD symptoms among the participants according to their sociodemographic and clinical characteristics.

Physical proximity to PTE and physical consequences of trauma

All the participants (n = 672) were working at four different mines within the area of the accident. At the time of the accident, 41.2% (277) of the participants were in the town where the mine is located, 37.4% (251) were working for the mining company where the accident occurred, and 63.3% (159) of these 251 participants were inside the mine when the accident occurred. Table 2 shows a comparison of the prevalence of PTSD symptoms among the participants according to their physical proximity to the PTE and the physical consequences of trauma.

The prevalence of PTSD symptoms and risk factors

The mean score on total PSS-SR was 4.27 (SD: ±4.49). Of the 672 participants, 18 (2.7%) who were evaluated two years after the accident were screened positive for PTSD symptoms by PSS-SR with a cut-off value of 14.

Factors such as not being married (66.7%), having a chronic illness (50%), having a comorbid psychiatric illness (22.2%), having a family history of psychiatric illness (27.8%), having more than one traumatic experience in the past (61.1%), working for the mine where the accident occurred (61.1%), being inside the disaster mine when the accident occurred (44.4%), and being injured (44.4%) were found

Table 1. Comparison of the prevalence of PTSD symptoms among the participants according to their sociodemographic and clinical characteristics

	n (%)	PTSD negative$^{\alpha}$ n = 654	PTSD positive$^{\beta}$ n = 18	*p*
Age, years (mean±SD)**	672 (100)	33.80±7.48	35.11±6.24	0.461
Age groups*				0.099
19-35	423 (62.9)	415 (63.5)	8 (44.4)	
>35	249 (37.1)	239 (36.5)	10 (55.6)	
Marital status*				**0.005**
Married	432 (64.3)	426 (65.1)	6 (33.3)	
Single/Divorced/Widowed	240 (35.7)	228 (34.9)	12 (66.7)	
Education status*				0.952
No high school degree	378 (56.3)	368 (56.3)	10 (55.6)	
High school graduate or above	294 (43.8)	286 (43.7)	8 (44.4)	
Household income*				0.333
High	55 (8.2)	52 (8.0)	3 (16.7)	
Average	401 (59.7)	390 (59.6)	11 (61.1)	
Low	216 (32.1)	212 (32.4)	4 (22.2)	
Chronic illness*				**0.040**
Yes	191 (28.4)	182 (27.8)	9 (50.0)	
No	481 (71.6)	472 (72.2)	9 (50.0)	
Comorbid psychiatric illness*				**0.017**
Yes	51 (7.6)	47 (7.2)	4 (22.2)	
No	621 (92.4)	607 (92.8)	14 (77.8)	
History of psychiatric illness*				0.435
Yes	105 (15.6)	101 (15.4)	4 (22.2)	
No	567 (84.4)	553 (84.6)	14 (77.8)	
Family history of psychiatric illness*				**0.002**
Yes	55 (8.2)	50 (7.6)	5 (27.8)	
No	617 (91.8)	604 (92.4)	13 (72.2)	
Previous traumatic experience*				**0.000**
No traumatic experience or one	579 (86.2)	572 (87.5)	7 (38.9)	
More than one traumatic experience	93 (13.8)	82 (12.5)	11 (61.1)	
PSS-SR score (mean±SD)**	672 (100)	3.81±3.48	20.94±5.51	**0.000**

Results shown in parenthesis are percentages unless stated otherwise. Statistical significance is highlighted as bold fonts. PTSD, Post-Traumatic Stress Disorder. PSS-SR, PTSD Symptom Scale-Self Report. α PTSD negative: Represents individuals who scored <14 on the PSS-SR. β PTSD positive: Represents individuals who scored ≥ 14 on the PSS-SR. * Chi-square test. ** Independent samples test.

Table 2. Comparison of the prevalence of PTSD symptoms among the participants according to their physical proximity to the potentially traumatic event and the physical consequences of trauma

	n (%)	PTSD negative$^{\alpha}$ n = 654	PTSD positive$^{\beta}$ n = 18	*p*
At the time of the accident, being in the town where the accident occurred*				0.082
Yes	277 (41.2)	266 (40.7)	11 (61.1)	
No	395 (58.8)	388 (59.3)	7 (38.9)	
Working for the mine where the accident occurred*				**0.035**
Yes	251 (37.4)	240 (36.7)	11 (61.1)	
No	421 (62.6)	414 (63.3)	7 (38.9)	
Being inside the disaster mine when the accident occurred*				**0.035**
Yes	159 (23.7)	151 (23.1)	8 (44.4)	
No	513 (76.3)	503 (76.9)	10 (55.6)	
Physical injury*				**0.029**
Yes	155 (23.1)	147 (22.5)	8 (44.4)	
No	517 (76.9)	507 (77.55)	10 (55.6)	
Physical injury/death of one of the family members or relatives*				0.251
Yes	457 (68.0)	447 (68.3)	10 (55.6)	
No	215 (32.0)	207 (31.7)	8 (44.4)	

Results shown in parenthesis are percentages unless stated otherwise. Statistical significance is highlighted as bold fonts. PTSD, Post-Traumatic Stress Disorder. α PTSD negative: Represents individuals who scored < 14 on the PSS-SR. β PTSD positive: Represents individuals who scored ≥ 14 on the PSS-SR. * Chi-square test.

to be significantly higher in participants who screened positive for PTSD symptoms than in those who screened negative (all p values < 0.05) (Table 1, Table 2).

Logistic regression analysis further showed that significant risk factors for PTSD included: being single/divorced/widowed compared to being married (OR = 3.53, 95% CI, 1.21-10.28; p = 0.021), having a chronic illness compared to have not (OR = 6.73, 95% CI, 2.06-21.93; p = 0.002), having a family history of psychiatric illness compared to have not (OR = 7.48, 95% CI, 2.01-27.81; p = 0.003) and previously experiencing PTEs more than one compared to have no or one experience (OR = 24.56, 95% CI, 7.03-85.77; p = 0.000).

Discussion

The mining sector is of critical importance for countries in terms of its contribution to employment and economic development[22]. However, mining is also considered to be the most risky sector in the world in terms of occupational health and safety[23]. The accident of 13 May 2014 that occurred in a major mining area in Turkey had crucial psychological effects on its victims.

In our study, the mean PSS-SR score was significantly higher in patients with a positive PTSD screen than in those with a negative PTSD screen. The obtained results support the discriminant validity of the scale. The internal consistency coefficient (Cronbach's alpha) of the entire scale was found to be 0.79, which is an acceptable value in terms of the scale's reliability. These results are consistent with those of another study investigating the psychometric properties of the PSS-SR in a Turkish sample[20].

The prevalence of PTSD symptoms, as determined by the PSS-SR, in our sample population (2.7%) far exceeds the estimated overall prevalence of PTSD which was reported by Li for the mining sector in South Africa (0.09%)[5]. The prevalence rate of PTSD symptoms observed after a coalmining disaster seems higher than overall prevalence suggesting that psychological impairments caused by traumatic exposure in coalmining disaster appear to be more profound than mining sector routine. Given that coal mine disasters occur owing to foreseeable and preventable reasons compared with other disasters, occupational safety education can be an effective method to prevent the resulting psychopathologies.

In our study, the participants were evaluated for PTSD symptoms at the end of the second year after the accident. Reviewing other similar disasters reported in the literature, it can be observed that at 3 and 6 months after a coal mining disaster in China, the prevalence of PTSD was 35.4% and 31.3%, respectively[24]. Another coalmining disaster in China, showed 50% of survivors had as PTSD at 2 months and 31% at 10 months post-disaster[25]. The rates obtained in the present study for this disaster seem to be low compared with the rates reported in the literature. However, this difference seems to be related with the time passed after trauma. We noted that the prevalence of PTSD seemed to decrease over time after the PTEs. The declining prevalence may be attributable to social support[26]. Social ties are shown to be associated with reduced stress caused by the feeling of threat in mine rescuers[27]. It is important to note that these studies all evaluated PTSD according to DSM-IV. It is possible that screening instruments based on DSM-5 criteria for PTSD, such as the PCL-5 would have given different prevalence rates[28].

In our study, there was no significant difference between participants who screened positive for PTSD symptoms and those who screened negative in terms of age, educational status, household income, and history of psychiatric illness before the accident. More experience in working underground and less PTSD are expected with increasing age[25]; however, in our study, no significant difference was observed between the groups according to age same as other studies[24,29,30]. The results of our study are consistent with the findings of other studies concluding that educational status is not an effective factor among those who developed PTSD[24,29-31]. Njenga *et al.*[30] showed that having current financial difficulties was associated with the emergence of PTSD symptoms; however, similar to other studies[24,32], there was no relationship between income level and PTSD in our study. Having a history of psychiatric illness has been shown to be a strong risk factor in the development of PTSD in the first three months following a trauma[29,32]. However, in our study, history of psychiatric illness before the accident did not show a significant difference between the groups of positive and negative PTSD screens. In their study on people who were directly exposed to terrorist bombing attacks, Verger *et al.*[31] found that having a history of psychiatric disorder before the explosion was not a risk factor within an average period of 2.6 years after the explosion. In the long term, the relevance of being previously diagnosed with a psychiatric disorder was not statistically significant.

Identification of another psychiatric condition concurrent with PTSD is not rare[33-36]. In our study, the rate of presence of comorbid psychiatric disease was found to be significantly higher in participants with a positive PTSD screen than in those with a negative PTSD screen; however, this was not found to be a risk factor for PTSD. PTSD may be a causal risk factor for other psychiatric disorders. Comorbid psychiatric disorders may develop as a complication of PTSD and its associated impairment[37,38].

In our study, not being married, having a comorbid chronic illness, having a family history of psychiatric illness, and having a history of more than one traumatic experience were identified as risk factors for PTSD by logistic regression analysis. Previous studies reported that PTSD developed at higher rates among single people or people living alone than in married people[30,35]. Similarly, in our study, not being married was determined as a risk factor for PTSD. Lack of social support after trauma can increase the likelihood of mental disorders[39,40]. Consistent with the study of Husky *et al.*[35], which emphasized the burden of comorbid medical conditions in PTSD, we also observed in our study that PTSD is associated with a significantly higher probability of chronic diseases. Tsujiuchi *et al.*[41] reported that significant predictors of probable PTSD were chronic physical diseases such as hypertension, hyperlipidemia, obesity, and coronary heart disease. Previous research in the general population found that PTSD respondents were 3 times more likely to report a family history of mental illness[42], in contrast, in another study, patients with PTSD did not differ from nonpsychiatric controls on the basis of family history[43]. Similar to our study, a meta-analysis by Brewin *et al.*[44] revealed that one of the risk factors for PTSD was family history of psychiatric disease. In the present study, we demonstrated that the participants who had more than one traumatic experience were 24 times more likely to be positive for PTSD symptoms compared to those without these experiences. Similar results of traumatic experience also have been observed in victims of terrorist attacks[45] and mineworkers who were involved in earth-fall mine accidents[46]. Multiple previous events had a stronger effect than a single previous event[47]. These results are consistent with a sensitization hypothesis, that is, early stressors producing greater responsiveness to subsequent stressors.

There is some evidence that proximity to a terror scene may increase the risk of PTSD symptoms[48,49] and that the closer one is to the terror scene, the greater is the PTSD symptoms level. However, Eşsizoğlu *et al.*[29] found that after a terrorist attack, proximity to the explosion was significantly higher among participants with PTSD at one month after the explosion, but not significantly different at the end of the third month. In our study, due to two years passing after the trauma, it is possible that the ratio of those located, at the time of the accident, in the town where the accident occurred among participants with a positive PTSD screen could not be obtained at a significantly high level. Paired analyses conducted with the data obtained in the present study revealed that, among those who screened positive for PTSD symptoms, there was no difference associated with physical injury or death of one of the family members or relatives. In a study conducted in Turkey after an industrial explosion, loss or injury of an acquaintance was found to be a risk factor for PTSD development[32]. In another study conducted after a terrorist bombing attack, the ratio of injury and mortality among acquaintances/relatives was found to be significantly higher in patients with PTSD, but this was not identified as a risk factor for PTSD development at 1st and 3rd months after the trauma[29].

When two groups with and without PTSD symptoms were compared, it was observed that the ratio of participants who worked for the mining company where the accident happened, who were exposed to a PTE in the mine at the time of the accident, and who survived the accident with a physical injury was significantly higher among those who screened positive for PTSD symptoms ($p < 0.05$), suggesting that these parameters could have an effect on PTSD symptoms. However, none of these parameters were detected to be a risk factor for PTSD: In a study conducted after a terrorist bombing attack in Kenya, mourning the death of a relative or acquaintance due to the explosion was found to be associated with PTSD development[30]. In our study, one-third of the participants working for the mining company where the accident occurred had colleagues or relatives inside the mine when the accident occurred (while they themselves were not in the mine at the time of the accident), and these participants mourned the loss of these 301 people after the accident. However, working for the mining company where the accident took place was not identified as a risk factor for PTSD, possibly because the time that elapsed after the accident was enough to allow these individuals to cope up with the mourning. As our study, similar studies have reported that the proximity of survivors to exposure to PTEs predicted the occurrence of PTSD[5,32]. In contrast, another study reported neither exposure to noninterpersonal events, (i.e., accidents, fire, and disaster) nor community violence (i.e., witnessing community violence or being the victim of community violence) was significantly associated with PTSD, only interpersonally PTEs (i.e., experiencing physical abuse, sexual abuse, and domestic violence) were significantly associated with PTSD[50]. People in our sample may have been exposed to various types of mining accident on a regular basis and may therefore have become desensitized and less distressed because of this type of trauma exposure. In the studies conducted after terrorist bombing attacks, physical injury sustained in the explosion was reported to be a risk factor for PTSD development[30,31]. This supports other studies that linked injury and the risk for PTSD[32,46]. But Green *et al.*[51] suggest PTSD was associated with work-related dysfunction equal to that associated with severe physical handicap. Among the participants, the fact that physical injury resulting from the accident did not prevent the person from working could be a reason why physical injury was not identified as a risk factor affecting the presence of PTSD symptoms.

There were certain limitations to our study. Although PSS-SR has been demonstrated to have good sensitivity and specificity, the Clinician-Administered Posttraumatic Stress Disorder Scale (CAPS) is considered the gold standard measurement tool for PTSD diagnosis. However, owing to the lack of trained clinicians to conduct psychiatric interviews and the time constraints, CAPS was not applied in our study. Another limitation of our study was that the DSM-5 criteria were not used for PTSD diagnosis. However, we could not find a self-report scale validated for DSM-5 criteria in the literature, which could have been used for screening PTSD.

Another limitation of this study is its retrospective design. The psychological consequences of the coalmining disaster were assessed through retrospective self-reports.

Despite these limitations, to the best of our knowledge, the current study is one of the very few research efforts to examine the long-term prevalence of PTSD symptoms several years after coalmining disaster. We surveyed a large sample of victims ($N = 672$), evaluated psychological outcomes 2 years after the coalmining disaster, and found a high prevalence of PTSD symptoms among mine workers. Our findings suggest that psychological care for some victims may have been inadequate in the 2-3 year period after the event and thus highlights the need for improved health services to address the intermediate and long-term physical, psychological, and social consequences of disasters. In view of the fact that a large portion of PTSD data were obtained from traumatic victims who generally had considerable heterogeneity in demographic characteristics, the present study represents high homogeneity in demographic background.

Conclusion

PTSD is a common mental health problem that has a substantial impact on the individual and society. The present study suggests that coalmining workers have considerably high prevalence rate of PTSD symptoms after a coalmining disaster. Not being married, having a chronic disease, having a family history of psychiatric illness, and having more than one traumatic experience are the risk factors that predict the presence of PTSD symptoms. Assessing PTSD and its associated symptoms is important from the standpoint of preventive mental health services. Early detection of traumatic stress and associated symptoms will facilitate the development of protective mental health and post-disaster mental health services in primary healthcare and prevention of the diseases from becoming chronic. For these reasons, the ability to identify and evaluate PTSD is of crucial importance.

Conflict of interests

The authors declare that they have no competing interest.

References

1. Safety and Health at Work: A Vision for Sustainable Prevention [Internet]. XX World Congress on Safety and Health at Work 2014: Global Forum for Prevention, 24 - 27 August 2014, Frankfurt, Germany/International Labour Office, Geneva: ILO; 2014. Available from: http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_301214.pdf. Accessed on: Jan 10, 2020.
2. Bilir N. Occupational health and safety profile [Internet]. International Labor Organization. Ankara: ILO Turkey Office; 2016. 124p. Available from: http://www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-ankara/documents/publication/wcms_498829.pdf. Accessed on: Jan 10, 2020.
3. TMMOB Maden Mühendisleri Odası Yönetim Kurulu. Madencilikte yaşanan iş kazaları raporu [Internet]. TMMOB Maden Mühendisleri Odası; 2010. 52p. Available from: http://www.maden.org.tr/resimler/ekler/9bd3e8809c72d94.
4. Asfaw A, Mark C, Pana-Cryan R. Profitability and occupational injuries in U.S. underground coal mines. Accid Anal Prev. 2013;50:778-86.
5. Li Z. Prevalence of post-traumatic stress disorder in the South African mining industry and outcomes of liability claims submitted to Rand Mutual Assurance Company. Occupational Health Southern Africa. 2013;19(2):22-6.
6. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Washington, DC: APA; 2013.
7. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. Washington, DC: APA; 1994.
8. Nally RJ. Posttraumatic stress disorder. In: Blaney PH, Millon T, eds. Oxford Textbook of Psychopathology. 2nd ed. New York: Oxford University Press; 2009. p. 178-90.
9. Kahil A. Investigation of secondary traumatic stress levels of professional and volunteers in assisting individuals with traumatic experiences. Ankara: Ufuk University; 2016. [cited 2019 Feb 11]. Available from: https://www.researchgate.net/publication/314177548_Travmatik_Yasantilari_Olan_Bireylere_Yardim_Davranisinda_Bulunan_Profesyonel_ve_Gonullulerin_Ikincil_Travmatik_Stres_Duzeylerinin_Incelenmesi. Accessed on: Jan 10, 2020.
10. Perkonigg A, Kessler RC, Storz S, Wittchen HU. Traumatic events and post-traumatic stress disorder in the community: prevalence, risk factors and comorbidity. Acta Psychiatr Scand. 2000;101(1):46-59.
11. Galea S, Nandi A, Vlahov D. The epidemiology of post-traumatic stress disorder after disasters. Epidemiol Rev. 2005;27:78-91.
12. Carlisle KN, Parker AW. Psychological distress and pain reporting in Australian coal miners. Saf Health Work. 2014;5(4):203-9.
13. Over 200 dead, many trapped in Turkish coal mine. USA Today News; 2014. Available from: https://www.usatoday.com/story/news/world/2014/05/13/turkey-coal-mine-disaster/9047103/. Accessed on: Jan 10, 2020.

14. Tokgünaydın S, Sütcü ST. Effectiveness of Cognitive Behavioral Group Therapy for Treatment of Posttraumatic Stress Disorder: A Systematic Review. Psikiyatride Güncel Yaklaşımlar. 2016;8:95-107.
15. Foa EB, Cashman L, Jaycox L, Perry K. The Validation of a Self-Report Measure of Posttraumatic Stress Disorder: The Posttraumatic Diagnostic Scale. Psychol Assessment. 1997;9(4):445-51.
16. Işıklı S. Travma Sonrası Stres Belirtileri Olan Bireylerde Olaya İlişkin Dikkat Yanlılığı, Ayrışma Düzeyi ve Çalışma Belleği Uzamı Arasındaki İlişkiler [dissertation]. Ankara: Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü; 2006.
17. Foa EB, Riggs DS, Dancu CV, Rothbaum BO. Reliability and validity of a brief instrument for assessing post-traumatic stress disorder. J Trauma Stress. 1993;6(4):459-74.
18. Sin GL, Abdin E, Lee J, Poon LY, Verma S, Chong SA. Prevalence of post-traumatic stress disorder in first-episode psychosis. Early Interv Psychiatry. 2010;4(4):299-304.
19. Coffey SF, Gudmundsdottir B, Beck G, Palyo SA, Miller L. Screening for PTSD in motor vehicle accident survivors using the PSS-SR and IES. J Trauma Stress. 2006;19(1):119-28.
20. Aydın A, Barut Y, Kalafat T, Boysan M, Beşiroğlu L. Posttraumatic stress disorder symptoms scale, self-assessment, psychometric properties of Turkish form. Anadolu Psikiyatri Dergisi. 2012;13(2):125-30.
21. Turkey – Occupational safety and health [Internet]. International Labor Organization (ILO). Available from: https://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=94667&p_country=TUR&p_count=778&p_classification=14&p_classcount=103. Accessed on: Jan 10, 2020.
22. The role of mining in national economies. Report [Internet]. ICMM (International Council on Mining and Metals). Available from: https://www.icmm.com/website/publications/pdfs/social-and-economic-development/romine_2nd-edition. Accessed on: Jan 10, 2020.
23. Mining: a hazardous work [Internet]. International Labour Organinization (ILO) home, 2015. Available from: https://www.ilo.org/safework/areasofwork/hazardous-work/WCMS_356567/lang--en/index.htm. Accessed on: Jan 10, 2020.
24. Wang HH, Zhang J, Tan QR, Yin H, Chen YC, Wang HN, et al. Psychopathological, biological, and neuroimaging characterization of posttraumatic stress disorder in survivors of a severe coalmining disaster in China. J Psychiatr Res. 2010;44(6):385-92.
25. Hou CL, Li LJ, Zhang Y, Li WH, Li ZX, Yang JL, et al. [Prevalence and risk factors for posttraumatic stress disorder among survivors from a coal mining accident after 2 and 10 months]. Zhong Nan Da Xue Xue Bao Yi Xue Ban. 2008;33(4):279-83.
26. Jia X, Ying L, Zhou X, Wu X, Lin C. The effects of extraversion, social support on the posttraumatic stress disorder and posttraumatic growth of adolescent survivors of the Wenchuan earthquake. PLoS One. 2015;10(3):e0121480.
27. Stasiła-Sieradzka M, Turska E. The feeling of threat and stress: the mediating role of social ties in the workplace on the example of the mine rescuer occupation. Medycyna Pracy. 2019;70(3):295-304.
28. Hoge CW, Riviere LA, Wilk JE, Herrell RK, Weathers FW. The prevalence of post-traumatic stress disorder (PTSD) in US combat soldiers: a head-to-head comparison of DSM-5 versus DSM-IV-TR symptom criteria with the PTSD checklist. Lancet Psychiatry. 2014;1(4):269-77.
29. Eşsizoğlu A, Yaşan A, Bülbül İ, Önal S, Yildirim EA, Aker T. Risk factors affecting post traumatic stress disorder after a terrorist attack. Türk Psikiyatri Dergisi. 2009;20(2):118-26.
30. Njenga FG, Nicholls PJ, Nyamai C, Kigamwa P, Davidson JR. Post-traumatic stress after terrorist attack: psychological reactions following the US embassy bombing in Nairobi: Naturalistic study. Br J Psychiatry. 2004;185:328-33.
31. Verger P, Dab W, Lamping DL, Loze JY, Deschaseaux-Voinet C, Abenhaim L, et al. The Psychological impact of terrorism: an epidemiologic study of posttraumatic stress disorder and associated factors in victims of the 1995-1996 bombings in France. Am J Psychiatry. 2004;161(8):1384-9.
32. Taymur İ, Sargin AE, Özdel K, Türkçapar HM, Çalişgan L, Zamki E, et al. Possible risk factors for acute stress disorder and post-traumatic stress disorder after an industrial explosion. Noro Psikiyatr Ars. 2014;51(1):23-29.
33. Woudenberg VC, Voorendonk EM, Bongaerts H, Zoet HA, Verhagen M, Lee CW, et al. Effectiveness of an intensive treatment programme combining prolonged exposure and eye movement desensitization and reprocessing for severe post-traumatic stress disorder. Eur J Psychotraumatol. 2018;9(1):1487225.
34. Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. Posttraumatic stress disorder in the national comorbidity survey. Arch Gen Psychiatry. 1995;52(12):1048-60.
35. Husky MM, Mazure CM, Kovess MV. Gender differences in psychiatric and medical comorbidity with post-traumatic stress disorder. Compr Psychiatry. 2018;84:75-81.
36. Brady KT. Posttraumatic stress disorder and comorbidity: recognizing the many faces of PTSD. J Clin Psychiatry. 1997;58(9):12-5.
37. Keane TM, Kaloupek DG, Ann NY. Comorbid psychiatric disorders in PTSD. Implications For Research. Ann N Y Acad Sci. 1997;821:24-34.
38. Breslau N. Epidemiologic studies of trauma, posttraumatic stress disorder, and other psychiatric disorders. Can J Psychiatry. 2002;47(10):923-9.
39. Solomon Z, Mikulincer M, Hobfoll SE. Objective versus subjective measurement of stress and social support: combat related reactions. J Consult Clin Psychol. 1985;55(4):577-83.
40. Özaltın M, Kaptanoğlu C, Aksaray G. Acute stress disorder and post-traumatic stress disorder after motor vehicle accidents. Türk Psikiyatri Dergisi. 2004;15:16-25.
41. Tsujiuchi T, Yamaguchi M, Masuda K, Tsuchida M, Inomata T, Kumano H, et al. High prevalence of post-traumatic stress symptoms in relation to social factors in affected population one year after the Fukushima Nuclear Disaster. PLoS One. 2016;11(3):e0151807.
42. Davidson JR, Hughes D, Blazer DG, George LK. Post-traumatic stress disorder in the community: an epidemiological study. Psychol. Med. 1991;21(3):713-21.
43. Davidson J, Smith R, Kudler H. Familial psychiatric illness in chronic posttraumatic stress disorder. Compr Psychiatry. 1989;30(4):339-45.
44. Brewin CR, Andrews B, Valentine JD. Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. Consult Clin Psychol. 2000;68(5):748-66.
45. Galea S, Ahern J, Resnick H, Kilpatrick D, Bucuvalas M, Gold J, et al. Psychological sequelae of the September 11 terrorist attacks in New York City. N Engl J Med. 2002;346(13):982-7.
46. Stevens JL, Calitz FJW, Joubert G, Gagiano CA, Nel M. Trauma-related risk factors in mine workers with PTSD: a prospective follow-up study. South Afr J Psychol. 2006;36(2):425-45.
47. Breslau N, Chilcoat HD, Kessler RC, Davis GC. Previous exposure to trauma and PTSD effects of subsequent trauma: results from the Detroit Area Survey of Trauma. Am J Psychiatry. 1999;156(6):902-7.
48. Grieger TA, Waldrep DA, Lovasz MM, Ursano RJ. Follow-up of pentagon employees two years after the terrorist attack of September 11, 2001. Psychiatr Serv. 2005;56:1378-4.
49. Mahat-Shamir M, Ring L, Hamama-Raz Y, Ben-Ezra M, Pitcho-Prelorentzos S, David UY, et al. Do previous experience and geographic proximity matter? Possible predictors for diagnosing Adjustment disorder vs. PTSD. Psychiatry Res. 2017;258:438-43.
50. Luthra R, Abramovitz R, Greenberg R, Schoor A, Newcorn J, Schmeidler J, et al. Relationship between type of trauma exposure and posttraumatic stress disorder among urban children and adolescents. J Interpers Violence. 2009;24(11):1919-27.
51. Green MM, McFarlane AC, Hunter CE, Griggs WM. Undiagnosed post-traumatic stress disorder following motor vehicle accidents. Med J Aust. 1993;159(8):529-34.

Original article

Assessment of sleep quality of patients with panic disorder and generalized anxiety disorder during remission: a case-control study

Yunus Hacimusalar[1]
https://orcid.org/0000-0002-1777-2707

Ozgul Karaaslan[1]
https://orcid.org/0000-0003-0829-5088

Received: 02/15/2019 – **Accepted:** 09/04/2019
DOI: 10.1590/0101-60830000000224

[1] *Bozok University Faculty of Medicine, Department of Psychiatry, Yozgat, Turkey.*

Abstract

Background: Sleep disorders are common in psychiatric diseases. Panic disorder (PD) and generalized anxiety disorder (GAD) are two major anxiety disorders that are associated with sleep disorders. **Objective:** We hypothesized that poor sleep quality continues in PD and GAD during remission. Therefore, in this study we aimed to compare the sleep quality of patients with PD and GAD to that of healthy controls. **Methods:** The study included patients with PD (n = 42) and GAD (n = 40) who had been in remission for at least 3 months and healthy control volunteers (n = 45). The patients were administered the Pittsburgh Sleep Quality Index (PSQI), Beck Anxiety Inventory (BAI), and Beck Depression Inventory (BDI). **Results:** The total PSQI scores of the GAD group were significantly increased in comparison to those of the PD ($p = 0.009$) and control ($p < 0.001$) groups. The rate of poor sleep quality in GAD during remission (77.5%) was greater than that of the PD (47.6%) and control (51.1%) groups ($p = 0.011$). **Discussion:** GAD is a chronic and recurrent disease. In this study, it was found that the deterioration in sleep quality of patients with GAD may continue during remission. In the follow-up and treatment of patients, it is appropriate to question about sleep symptoms and to plan interventions according to these symptoms.

Hacimusalar Y, Karaaslan O / Arch Clin Psychiatry. 2020;47(1):19-24

Keywords: Anxiety disorders, sleep quality, sleep disturbance, remission, psychiatric diseases.

Introduction

Among the anxiety disorders, panic disorder (PD) and generalized anxiety disorder (GAD) are two diseases for which patients frequently visit the clinics. The overall prevalence of anxiety disorders is estimated to be 28.8%. The estimated prevalence of PD and GAD have been reported as 4.7% and 5.7%, respectively[1]. In some studies, GAD and specific phobias are the two most common anxiety disorders[2]. Anxiety disorders were the sixth leading cause of disability in countries of both high and low-middle socioeconomic status. The global burden of disease approach uses the disability-adjusted life year (DALY), and globally, anxiety disorders accounted for 390 DALYs per 100,000 persons[3].

In PD and GAD, anxiety may give rise to physical signs and cognitive symptoms such as attention and concentration impairment and sleep disruption. The symptoms and signs of anxiety and sleep disorders frequently overlap. The sleep disorder may be a preliminary indication of anxiety, as well as a risk factor for developing an anxiety disorder[4]. In recent years there has been a shift towards assessing the overall impact of illness on the aspects of quality of life (QoL). Determining the effects of diseases on the quality of life and applying treatments for them has become more important. Sleep disorders and poor sleep quality adversely affect QoL[5,6]. The sleep disorders are quite prevalent and accompany various psychiatric diseases[7,8]. Poor physical health adversely impacts mental health and quality of life[9-11].

Sleep disturbance is commonly observed in individuals with anxiety disorders[12]. Compared to healthy controls, those with PD exhibit increased sleep onset latency, decreased sleep efficiency, decreased total sleep time, and many altered components of sleep[4,8,12,13]. A prevalence of 77% for restless and disturbed sleep and 68% for difficulties in falling asleep has been reported in patients with PD[8]. Individuals with GAD exhibit decreased total sleep time, increased sleep onset latency, and variations in non-rapid eye movement (NREM) sleep[12]. Insomnia is recognized as a serious and significant health problem in patients with GAD[14]. More consistent findings on sleep disturbance in GAD have been reported, and sleep disturbance is included in the GAD diagnostic criteria[15]. The signs and symptoms of a sleep disorder are frequently experienced when the anxiety of PD or GAD is intense[11]. Characteristic polysomnographic findings are present in both diseases[8]. Hoge *et al.* hypothesized that amongst individuals with PD, higher anxiety sensitivity would be associated with sleep disruption, particularly in the form of increased sleep latency[16]. Higher anxiety sensitivity involves increases in attention and fearfulness about anxiety itself, and its associated physical sensations, which in turn may cause excessive arousal. Similar mechanisms may also be a cause of sleep disturbance in GAD. A day-long episode of anxiety in GAD may lead to stimulation that further causes sleep disruption. Despite all this information, the cause of sleep disorder in both PD and GAD is not known.

The period of remission in psychiatric diseases is defined as a notable reduction in signs and symptoms of the disease, or a nearly total resolution. Considering the recurring characteristics of PD and GAD, some signs and symptoms may persist in the remission period. There are many studies which have assessed the quality of sleep during the period when PD and GAD are uncontrolled. However, to the best of our knowledge, there is no study that assesses the quality of sleep in PD and GAD during remission and compares them to healthy controls. As is the case with many psychiatric diseases, the residual symptoms present in the period of improvement affect the ability of the patients to fully resume their pre-disease status and functionality. Improvement in residual symptoms, other than the main symptoms of anxiety, may significantly contribute to the feeling of wellness and functionality of the individuals. This study aimed to assess the quality of sleep of patients with PD and GAD during remission and to compare the assessment with that of healthy controls. In this study, our hypothesis was that (1) sleep quality is poorer in PD and GAD patients than in healthy controls; and (2) because GAD is more chronic, its sleep quality deterioration would be higher than in PD.

Address for correspondence: Yunus Hacimusalar Address: Bozok University Faculty of Medicine, Department of Psychiatry, TR-66200, Yozgat, TURKEY
E-mail: hacimusalar@yahoo.com Phone: +905052421573 Fax: +90 (354) 217 10 72.

Methods

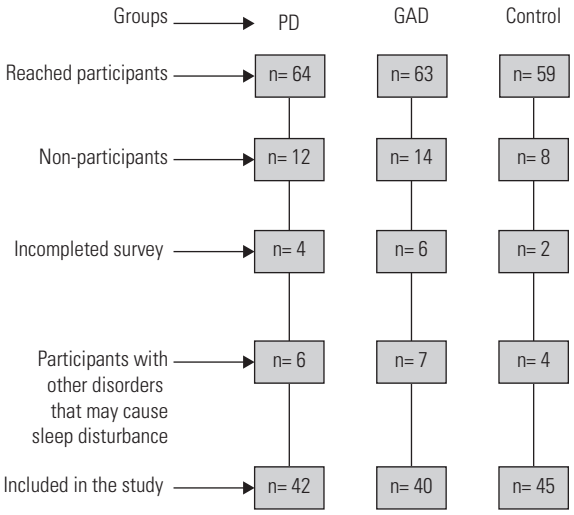
This was a cross-sectional, case-control study. The study included patients with the diagnosis of PD and GAD according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) diagnostic criteria[1]. They had presented to the psychiatry clinic of the Faculty of Medicine Hospital of Yozgat Bozok University and were followed up in the same clinic by two specialized physicians (YH, OK). Included in the study were patients aged 15-65 years, with no additional psychiatric disease, who had been in remission from PD or GAD for no less than 3 months, who were cognitively able to complete the test (Ÿdid not have difficulty in understanding the self-reported questionnaires), and who scored 9 or lower on the BDI and 7 or lower on the BAI. A clinical examination was performed, and patients with a BAI score of 7 or less at the time of the study and within the last 3 months according to hospital records were determined to be in remission. Regarding their treatments, only patients in whom selective serotonin reuptake inhibitors (SSRIs) or serotonin and norepinephrine reuptake inhibitors (SNRIs) had been prescribed were included. The control group was comprised of medical personnel employed in the same hospital and patients' relatives who were free of any physical or psychiatric ailment or known sleep disorder. For each participant, depression levels were evaluated by means of the Beck Depression Inventory (BDI), anxiety levels by means of the Beck Anxiety Inventory (BAI), and quality of sleep by means of the Pittsburgh Sleep Quality Index (PSQI). Those with chronic physical diseases, those with physical or psychiatric diseases that may cause sleep disorder, users of benzodiazepines and/or stimulants, those with an alcohol abuse disorder, and pregnant persons were excluded. A total of 167 persons were included (42 with PD, 40 with GAD, and 45 healthy controls) (Figure 1).

The participants were informed about the study, and written informed consent was obtained from all participants before their entry. The study was approved by the local Ethics Committee of Yozgat Bozok University, with a protocol number of 2017-KAEK-189_2018.05.16_05, and it was performed under the ethical principles of the Declaration of Helsinki for medical research involving human subjects.

Assessment tools

Data collection form

This form was prepared by the researchers and contains information such as age, gender, education, smoking status, and height and weight of the participants.



PD: panic disorder; GAD: generalized anxiety disorder.

Figure 1. Flow chart of participants.

Pittsburgh Sleep Quality Index (PSQI)

The PSQI was developed by Buysse *et al.*[17], and the Turkish validity and reliability study was conducted by Ağargün *et al.*[18]. The PSQI is a 19-item self-report scale that assesses sleep quality and disturbance over the past month. It consists of 24 questions, of which 19 involve self-assessment and 5 are answered by his or her sleep partner. The 18 questions scored in the scale consist of 7 components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medications, and daytime dysfunction. Each component is rated from 0 to 3 points. The total score is the sum of the 7 subscales' scores. The total PSQI score ranges between 0 and 21 points. A high total PSQI score indicates poor sleep quality and severe sleep disturbance. A total PSQI score of over 5 points indicates clinically poor sleep quality.

Beck Depression Inventory (BDI)

The BDI was developed by Beck *et al.*[19] to evaluate the physical, emotional, cognitive, and motivational symptoms seen in depression. The BDI is a scale consisting of 21 self-evaluation sentences, and each symptom category has four options. Each item is scored between 0 and 3 points, and the total score ranges from 0 to 63 points. In terms of the severity of depressive symptoms, 0 to 9 points indicates minimal symptoms. The Turkish validity and reliability study was performed by Hisli *et al.*[20].

Beck Anxiety Inventory (BAI)

The BAI was developed by Beck *et al.*[21] to assess the extent of an individual's anxiety symptoms. Based on self-reporting, the BAI consists of 21 items, and each item is scored between 0 and 3 points. The total score ranges from 0 to 63 points. The total score obtained from the scale indicates the severity of the individual's anxiety. The Turkish validity and reliability study was carried out by Ulusoy *et al.*[22].

Statistical analysis

Statistical analysis was performed using the SPSS 22.0 (Statistical Package for Social Sciences, IBM Inc., Chicago, IL, USA) package program. The descriptive statistics for the data were calculated, and the Kolmogorov–Smirnov methods were applied for testing the normality distribution. The chi-square test was used for comparison of groups with respect to the categorical variables. ANOVA and the post hoc Tukey test were applied to the 3-group comparison of the data which exhibited normal distribution. The Kruskal-Wallis H test was used for group comparisons of non-parametric variables, and omnibus effects were explored using the Mann-Whitney U test to determine which pairs of groups differed. p significance was determined by dividing the significance value by the number of groups. The Bonferroni correction for multiple comparisons was used (0.05/3=0.016). The Pearson's correlation test was used for the normally distributed data, and the Spearman's correlation test was used for data not showing a normal distribution. A regression model was established for the variables showing significant correlation, and diagnostic tests of this model were carried out. A p value of less than 0.05 was considered statistically significant. After the evaluation of previous study results, a power analysis was performed. The alpha and beta errors were stated, respectively, as 0.05 and 0.20. The minimum number of patients needed to obtain 80% power was calculated as 34 for each group.

Results

The average age in the PD group was 44.38 ± 13.58 years; in the GAD group it was 47.28 ± 10.76 years, and in the control group it was 41.51 ± 10.46 years. No significant differences appeared in terms of age, gender, and smoking habits between the groups ($p > 0.05$). The body mass indexes (BMIs) of the GAD and PD groups were significantly higher compared to that of the control group

($p < 0.001$). The duration of disease for the PD group was significantly higher than that of the GAD group ($p < 0.001$) (Table 1). There was no statistically significant difference between the PD and GAD groups in terms of the medications used by the participants ($p = 0.258$) (Table 2).

Although the BDI and BAI scores of the patients in the PD and GAD groups remained within normal limits, they are significantly higher with reference to the control group ($p < 0.001$). The difference among the three groups in terms of total PSQI scores was statistically significant ($p < 0.001$). Pairwise comparisons conducted in order to determine the source of the difference revealed statistically higher significance for the total PSQI scores of the GAD group compared to the PD and control groups ($p = 0.009$; $p < 0.001$, respectively). When the sleep quality was assessed as poor for those having a total PSQI score higher than 5, the sleep quality of 77.5% (n = 31) of the patients with GAD, 47.6% (n = 20) of the patients with PD, and 51.1% of the control group patients (n = 23) was poor, and the difference was statistically significant ($p = 0.011$). After pairwise comparisons, the proportion of GAD patients having poor sleep was significantly higher compared to the PD and control groups ($p = 0.005$; $p = 0.012$, respectively). The difference between the PD and control groups was not statistically significant ($p > 0.05$) (Table 3). When a post hoc power analysis was applied with alpha 0.05, the power of the study was found to be 0.9885.

Table 1. Evaluation of demographic features by groups

			Groups		Test Value
		PD (n = 42)	GAD (n = 40)	Controls (n = 45)	*p*
Age	Mean ± SD	44.38 ±13.58	47.28 ± 10.76	41.51 ± 10.46	F: 2.584
	Min-Max	22 - 65	23 - 65	24 - 63	0.080[a]
BMI	Mean ± SD	29.26 ± 5.54d	30.13 ± 4.67d	26.02 ± 5.15	F: 8.544 **<0.001[a]
Smoking	Mean ± SD (number/day)	16.43 ± 11.63	12.44 ± 7.58	13.21 ± 8.55	F: 0.592 0.559[a]
Duration of disease (months)	Mean ± SD Min-Max (Median)	67.29 ± 8.61 5-240 (48)[e]	47.58 ± 8.48 12-240 (22)	--	Z: -2.321 *0.020[b]
		n (%)	n (%)	n (%)	
Gender	Female	24 (57.1)	26 (65.0)	26 (57.8)	χ^2: 0.650
	Male	18 (42.9)	14 (35.0)	19 (42.2)	0.723[c]
Smoking	Smokers Non-smokers	14 (33.3) 28 (66.7)	9 (22.5) 31 (77.5)	14 (31.1) 31 (68.9)	χ^2: 1.297 0.523[c]

* $p < 0.05$. ** $p < 0.01$. [a] ANOVA. [b] Mann-Whitney U test. [c] Pearson Chi-Square test. [d] Significantly higher than in the control group; [e] Significantly higher than in the GAD group. PD: panic disorder; GAD: generalized anxiety disorder; BMI: body mass index.

Table 2. Medications used by patients

	Groups		Test Value	
	PD (n = 42)	GAD (n = 40)	χ^2	*p*
SSRIs	78.6% (n = 33)	67.5% (n = 27)	1.279	0.258
Escitalopram	16	13		
Sertraline	7	5		
Paroxetine	6	4		
Fluoxetine	3	1		
Citalopram	2	2		
Fluvoxamine	-	1		
SNRIs	21.4% (n = 9)	32.5% (n = 13)		
Duloxetine	4	9		
Venlafaxine	5	4		

χ^2: Chi-square value; PD: panic disorder; GAD: generalized anxiety disorder; SSRIs: selective serotonin reuptake inhibitors; SNRIs: serotonin and norepinephrine reuptake inhibitors.

Table 3. Evaluation of scores of Beck Depression Scale, Beck Anxiety Scale, and Pittsburgh Sleep Quality by groups

	Groups			Test Value
	PD (n = 42)	GAD (n = 40)	Control (n = 45)	*p*
BAI Min-Max (Median) Mean ± SD				
	5-7 (6)[b]	4-7 (5)[b]	2-5 (4)	χ^2: 84.562
	5.86 ± 0.75	5.58 ± 0.74	3.56 ± 0.72	**<0.001[a]
BDI Min-Max (Median) Mean ± SD				
	4-6 (5)[b]	3-6 (4)[b]	2-4 (3)	χ^2: 84.677
	4.86 ± 0.75	4.58 ± 0.55	2.60 ± 0.65	**<0.001[a]
PSQI Min-Max (Median) Mean ± SD				
	0-12 (5)	0-17 (9)[c]	0-15 (6)	χ^2: 15.591
	6.52±3.74	9.0 ± 4.09	5.64 ± 3.21	**<0.001[a]
Sleep Quality	n (%)	n (%)	n (%)	
Good	22 (52.4)	9 (22.5)	22 (48.9)	χ^2: 8.991
Poor	20 (47.6)	31 (77.5)[c]	23 (51.1)	*0.011[d]

* p < 0.05. **p < 0.01. [a] Kruskal-Wallis test. [b] Significantly higher than in the control group. [c] Significantly higher than in the PD group and control group. [d] Pearson Chi-Square test.
BAI: Beck Anxiety Scale; BDI: Beck Depression Scale; PSQI: Pittsburgh Sleep Quality Index; PD: panic disorder; GAD: generalized anxiety disorder.

Analysis of the sub-components of the PSQI demonstrated a significant difference in terms of subjective sleep quality (p = 0.008), sleep latency (p < 0.001), sleep duration (p < 0.001), habitual sleep efficiency (p = 0.027), use of sleep medications (p = 0.014), time spent in bed (p = 0.049), and sleep duration (p < 0.001) (Table 4). When pairwise comparisons were conducted to find out the source of differences, the subjective sleep quality (Z: -2.793; p = 0.005), sleep duration (Z: -4.002; p < 0.001), and habitual sleep efficiency (Z: -2.589; p = 0.01) scores of patients with GAD were significantly higher compared to those of the PD group. The scores for subjective sleep quality (Z: -2.508; p = 0.012), sleep latency (Z: -3.762; p < 0.001), and use of sleep medications (Z: -1.255; p = 0.005) were significantly higher in GAD patients than in controls. The sleep latency (Z: -3.450; p = 0.001), sleep duration (Z: -2.997; p = 0.003), and use of sleep medications (Z: 2.651; p = 0.008) of the patients with PD were significantly higher than in the control group.

In all participants evaluated together, there were positive correlations between the total PSQI scores and BMI (r: 0.247; p = 0.005), the number of cigarettes smoked daily (r: 0.422; p = 0.009), BAI score (r: 0.201; p = 0.023), and BDI score (r: 0.204; p = 0.021) (Table 5). When correlation analysis was performed in each group, there were positive correlations between the total PSQI scores and BMI (r: 0.314; p = 0.035) and the number of cigarettes smoked daily (r: 0.799; p = 0.001) only in the control group. In multiple regression analysis, the effect of daily cigarette smoking on the total PSQI level was 66.9% in healthy control patients (F [1,13] = 27.264; p < 0.001). A negative correlation existed between the total PSQI scores and duration of disease in the patient group (r: -0.350; p = 0.001). When correlation analysis was performed in each patient group, the correlation between the total PSQI scores and the duration of disease was not significant (p > 0.05).

In multi-linear regression analysis, the evaluation of daily number of cigarettes, BMI, BAI score, and BDI score on the total PSQI scores revealed a statistically significant effect for daily number of cigarettes (Beta: 0.425; t: 2.731; p = 0.010).

Table 4. Evaluation of scores of Pittsburgh Sleep Quality Index sub-components between groups

	Groups			Test Value
	PD (n = 42)	GAD (n = 40)	Control (n = 45)	*p*[a]
Subjective Sleep Quality Min-Max (Median)	0-3 (1)	0-3 (2)[b,c]	0-3 (1)	χ^2: 9.708 0.008**
Sleep Latency Min-Max (Median)	0-3 (2)[b]	0-3 (3)[b]	0-3 (2)	χ^2: 18.610 <0.001**
Sleep Duration Min-Max (Median)	0-3 (0)[b]	0-3 (1)[c]	0-3 (1)	χ^2: 18.618 <0.001**
Habitual Sleep Efficiency				χ^2: 7.201
Min-Max (Median)	0-2 (0)	0-3 (1)[c]	0-3 (0)	0.027*
Sleep Disturbances				χ^2: 2.325
Min-Max (Median)	0-2 (1)	0-3 (1)	0-2 (1)	0.313
Use of Sleep Medication				χ^2: 8.527
Min-Max (Median)	0-3 (0)[b]	0-3 (0)[b]	0-2 (0)	0.014*
Daytime Dysfunction				χ^2: 5.534
Min-Max (Median)	0-3 (1)	0-3 (1)	0-3 (1)	0.063
Duration in Bed				
Min-Max (Median)	4-12 (9)[b]	4-11 (7.75)	5.5-11 (7.5)	χ^2: 6.045
Avg. ± SD	8.31 ± 0.25	7.73 ± 0.23	7.72 ± 0.16	0.049*
Sleep Duration (hours)				
Min-Max (Median)	4.5-8 (8)[b,d]	4.5-8 (6.5)	4.5-8 (6.5)	χ^2: 18.618
Avg. ± SD	7.28 ± 0.15	6.25 ± 0.17	6.67 ± 0.14	<0.001**
Sleep Percentage (sleep duration/ duration in bed)				
Min-Max (Median)	66.7-99 (88.9)	50-99 (81.2)	40.9-99 (86.6)	χ^2: 3.387
Avg. ± SD	87.65 ± 1.40	81.85 ± 2.16	86.28 ± 1.63	0.184

* p < 0.05. ** p < 0.01. [a] Kruskal-Wallis Test. [b] Significantly higher than in the control group. [c] Significantly higher than in the PD group. [d] Significantly higher than in the GAD group. PD: panic disorder; GAD: generalized anxiety disorder.

Table 5. Review of correlation among Pittsburgh Sleep Quality Index, Beck Anxiety Scale, Beck Depression Scale, body mass index, daily cigarette consumption and duration of disease

	PSQI	
	r	*p*
All Groups		
BAI	0.201	0.023*
BDI	0.204	0.005**
BMI	0.247	0.005**
Daily cigarette consumption	0.422	0.009**
PD and GAD group		
Duration of disease	-0.350	0.001**

r = Spearman's correlation coefficient. * p < 0.05. ** p < 0.01. PSQI: Pittsburgh Sleep Quality Index; BAI: Beck Anxiety Scale; BDI: Beck Depression Scale; BMI: body mass index; PD: panic disorder; GAD: generalized anxiety disorder.

Discussion

In this study, even though the depression and anxiety levels of the patients with PD and GAD remained within normal limits, they were higher than in the control group. The sleep quality of the patients with GAD proved poorer in comparison to the PD and control groups. The sleep quality of the PD and GAD groups was poorer compared to the control group with respect to many sub-components of the PSQI. A collective evaluation of all groups suggests that smoking, increased age, and increases in BMI adversely affect sleep quality. Those with lesser duration of disease also have poorer sleep quality.

Anxiety and fear result in an increase in cortical and peripheral stimulation. Anxiety affects sleep, influencing the hypothalamic-pituitary-adrenal axis and various other systems[23]. Stimulation also occurs in the case of any disorder that adversely affects starting and sustaining sleep. In general, a mutual interaction exists between anxiety and sleep disorder. The existence of either boosts the effect of the other[24,25].

Chronic anxiety and strain comprise the basic features of GAD. GAD is associated with difficulty in starting and sustaining sleep[4,15]. Sleep disorder is more highly associated with GAD than with PD[4]. Extreme anxiety or worried expectation, the basic features of GAD play a significant role in the emergence and persistence of sleep disorders[26]. Certain studies have found that the prevalence of sleep disorders in patients with GAD is 50% to 85%, and such disorders are observed in various stages of sleep[8,14,27]. It is further known that if GAD symptoms are more severe, the prevalence of insomnia is higher[28]. The main finding of this study is that the sleep quality of patients with GAD in remission is lower compared to the individuals in the PD and control groups. Furthermore, subjective sleep quality, sleep duration, and habitual sleep efficiency in GAD patients was lower than in the PD group. In addition, subjective sleep quality, sleep latency, and daytime dysfunction were worse in GAD patients compared to the controls. The results of our study indicate that the adverse effects of GAD on sleep may persist despite the improvement in signs and symptoms of anxiety during the period of remission. This fact may be interpreted in a manner where the chronic and recurring feature of GAD and signs of sleep disorder survive in spite of a decline in signs of anxiety or meliorate in a longer term as compared to the signs of anxiety. In the study of Ramsawh *et al.*, the strongest relationship between sleep disorder and anxiety was discovered in the GAD group[11]. The sleep disorder in patients with GAD may be observed in the form of residual signs, as is the case with numerous chronic psychiatric diseases. In our study, we determined a proportion of GAD patients with poor sleep quality (77.5%), and this percentage was just as high as it was during the peak attacks of the disease. This demonstrates that the sleep quality of patients with GAD does not improve even if the symptoms of anxiety are in remission.

Although certain studies have concluded that sleep disorder is more common in patients with PD than in healthy controls, there are other studies in which this is not addressed[4,8]. The panic attacks experienced during sleep may lead to insomnia by instilling fear in the individuals. One of the factors affecting the sleep disorder in PD is the presence of depression. Although the total PSQI scores of the patients with PD were similar to those of the control group, the sub-components, namely sleep latency, sleep duration, use of sleep medications, and duration in bed, were higher than in the control group. This result shows that sleep quality in patients with PD is poor in certain respects. The patients in our study did not have any panic attacks, since they were in remission. Moreover, any patients with past and current depression had been excluded.

The medications used in the treatment of anxiety disorders may also impact sleep quality. However, the patients with PD and GAD in our study exhibited similar features in terms of the medications that they used.

Smoking is considered one of the significant factors having an impact on sleep quality. It is common knowledge that smoking has adverse effects on sleep for different reasons. The number of cigarettes smoked daily is the most important factor that harms sleep quality[29,30]. In our study, with all participants evaluated together, there was a positive correlation between total PSQI scores and the number of cigarettes smoked daily. However, when correlation analysis was performed in each group, there was a positive correlation only in the control group between PSQI scores and the number of cigarettes smoked daily. The effect of daily cigarette smoking on poor sleep quality was approximately 67% in healthy controls.

The sleep pattern is known to vary with age, and insomnia increases with age. Our study also determined that sleep quality deteriorates with age. This result is consistent with the body of literature[31].

High BMI may adversely affect many systems, from metabolic issues to the respiratory tract. Sleep quality worsens owing to such effects[32]. In our study, as BMI increased, the sleep quality worsened.

The poorer sleep quality in those individuals with shorter disease duration may be due to experiencing more sleep disruption in the initial periods of the disease due to acute anxiety. The sleep disorder may improve if the patients develop mechanisms to cope with the problem in time.

Sleep disorder gives rise to significant losses of functionality in daily life. The significant sleep disorders associated with GAD are not fully healed. It has been demonstrated that individuals with anxiety disorders and poor sleep have significantly worse mental health-related quality of life and increased disability compared to those with anxiety disorders alone[11]. Although the symptoms of anxiety improve during the periods of wellness in the patients with PD and GAD, the other residual symptoms can persist. In PD and GAD, disruption with respect to some areas of sleep, in addition to overall deterioration of sleep quality, is more common.

The fact that this study is cross-sectional, with a small number of participants, serves as a significant limitation. Although the PSQI is a validated sleep quality scale, it alone is not sufficient for the evaluation of sleep quality and the sub-components of sleep disorders. In larger sample groups, the quality of sleep should be evaluated by more objective tests, such as actigraphy or polysomnography, and follow-up studies should further be conducted. Caffeine intake may affect sleep quality. Participants weren't asked about their amounts of caffeine and black tea intake.

Consequently, the sleep disorder is an important component of anxiety disorders. Although treatments aimed at the primary disease may result in improved symptoms, this result itself is not sufficient. The sleep disorder in patients with GAD may persist despite adequate treatment of the anxiety symptoms. Enquiring about sleep disorder in patients with GAD in remission, and administering pharmacologically and non-pharmacologically specific treatments intended for this purpose, is of great importance.

Disclosure

No conflicts of interest are declared by the authors.

Financial disclosure

The authors declare that this study has received no financial support.

References

1. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry. 2005;62(6):593-602.
2. Remes O, Brayne C, van der Linde R, Lafortune L. A systematic review of reviews on the prevalence of anxiety disorders in adult populations. Brain Behav. 2016;6(7):e00497.
3. Baxter AJ, Vos T, Scott KM, Ferrari AJ, Whiteford HA. The global burden of anxiety disorders in 2010. Psychol Med. 2014;44(11):2363-74.
4. Mellman TA. Sleep and anxiety disorders. Sleep Med Clin. 2008;3:261-8.
5. Kyle SD, Morgan K, Espie CA. Insomnia and health-related quality of life. Sleep Med Rev. 2010;14(1):69-82.

6. Szentkirályi A, Madarász CZ, Novák M. Sleep disorders: impact on daytime functioning and quality of life. Expert Rev Pharmacoecon Outcomes Res. 2009;9(1):49-64.
7. Sateia MJ. Update on Sleep and Psychiatric Disorders. Chest. 2009;135(5):1370-9.
8. Papadimitriou GN, Linkowski P. Sleep disturbance in anxiety disorders. Int Rev Psychiatry. 2005;17(4):229-36.
9. Cinosi E, Di Iorio G, Acciavatti T, Cornelio M, Vellante F, De Risio L, et al. Sleep disturbances in eating disorders: a review. Clin Ter. 2011;162(6):e195-202.
10. Roth T, Jaeger S, Jin R, Kalsekar A, Stang PE, Kessler RC. Sleep Problems, Comorbid Mental Disorders, and Role Functioning in the National Comorbidity Survey Replication. Biol Psychiatry. 2006;60(12):1364-71.
11. Ramsawh HJ, Stein MB, Belik SL, Jacobi F, Sareen J. Relationship of anxiety disorders, sleep quality, and functional impairment in a community sample. J Psychiatr Res. 2009;43(10):926-33.
12. Cox RC, Olatunji BO. A systematic review of sleep disturbance in anxiety and related disorders. J Anxiety Disord. 2016;37:104-29.
13. Staner L. Sleep and anxiety disorders. Dialogues Clin Neurosci. 2003;5:249-58.
14. Ferre Navarrete F, Pérez Páramo M, Fermin Ordoño J, López Gómez V. Prevalence of Insomnia and Associated Factors in Outpatients With Generalized Anxiety Disorder Treated in Psychiatric Clinics. Behav Sleep Med. 2017;15(6):491-501.
15. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 5th ed. Washington, DC: American Psychiatric Association; 2013.
16. Hoge EA, Marques L, Wechsler RS, Lasky AK, Delong HR, Jacoby RJ, et al. The role of anxiety sensitivity in sleep disturbance in panic disorder. J Anxiety Disord. 2011;25:536-8.
17. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res. 1989;28(2):193-213.
18. Ağargün MY, Kara H, Anlar Ö. The Validity and Reliability of the Pittsburgh Sleep Quality Index. Türk Psikiyatr Derg. 1996;7:107-15.
19. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry. 1961;4:561-71.
20. Hisli N. Beck depresyon envanteri'nin geçerliği üzerine bir çalışma. Türk Psikol Derg. 1988;22:118-26.
21. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: Psychometric properties. J Consult Clin Psychol. 1988;56(6):893-7.
22. Ulusoy M, Sahin NH, Erkmen H. Turkish Version of the Beck Anxiety Inventory: Psychometric Properties. J Cogn Psychother. 1998;12:163-72.
23. Öztürk AB, Özenli Y, Öztürk SB, Önel S, Söker G, Seydaoglu G. The effect of psychoeducation on anxiety and pain in patients with mastalgia. Nord J Psychiatry. 2015;69(5):380-5.
24. Roy-Byrne PP, Uhde TW, Post RM. Effects of one night's sleep deprivation on mood and behavior in panic disorder. Patients with panic disorder compared with depressed patients and normal controls. Arch Gen Psychiatry. 1986;43(9):895-9.
25. Alfano CA, Ginsburg GS, Kingery JN. Sleep-related problems among children and adolescents with anxiety disorders. J Am Acad Child Adolesc Psychiatry. 2007;46(2):224-32.
26. Harvey AG. A cognitive model of insomnia. Behav Res Ther. 2002;40(8):869-93.
27. Brenes GA, Miller ME, Stanley MA, Williamson JD, Knudson M, McCall WV. Insomnia in older adults with generalized anxiety disorder. Am J Geriatr Psychiatry. 2009;17(6):465-72.
28. Monti JM, Monti D. Sleep disturbance in generalized anxiety disorder and its treatment. Sleep Med Rev. 2000;4(3):263-76.
29. McNamara JPH, Wang J, Holiday DB, Warren JY, Paradoa M, Balkhi AM, et al. Sleep disturbances associated with cigarette smoking. Psychol Health Med. 2014;19(4):410-9.
30. Cohrs S, Rodenbeck A, Riemann D, Szagun B, Jaehne A, Brinkmeyer J, et al. Impaired sleep quality and sleep duration in smokers-results from the German Multicenter Study on Nicotine Dependence. Addict Biol. 2014;19(3):486-96.
31. Atalay H. Comorbidity of insomnia detected by the Pittsburgh Sleep Quality Index with anxiety, depression and personality disorders. Isr J Psychiatry Relat Sci. 2011;48(1):54-9.
32. Vargas PA, Flores M, Robles E. Sleep Quality and Body Mass Index in College Students: The Role of Sleep Disturbances. J Am Coll Health. 2014;62(8):534-41.

The latent structure and reliability of the emotional trait section of the Affective and Emotional Composite Temperament Scale (AFECTS)

Hudson W. de Carvalho[1]
https://orcid.org/0000-0001-8360-5053

Hugo Cogo-Moreira[2]
https://orcid.org/0000-0001-9411-9237

Karen Jansen[3]
https://orcid.org/0000-0003-3494-8070

Luciano Souza[3]
https://orcid.org/0000-0001-9965-4837

Jerônimo Branco[3]
https://orcid.org/0000-0001-6750-2740

Ricardo Silva[3]
https://orcid.org/0000-0002-9114-7037

Diogo R. Lara[4]
https://orcid.org/0000-0002-6690-9490

Received: 02/23/2019 – **Accepted:** 01/14/2020
DOI: 10.1590/0101-60830000000225

[1] Department of Psychology, Federal University of Pelotas, Pelotas, RS, Brazil.
[2] Graduate Program in Psychiatry and Medical Psychology, Federal University of São Paulo, São Paulo, SP, Brazil.
[3] Postgraduate Program in Health and Behavior, Catholic University of Pelotas , Pelotas, RS, Brazil.
[4] Faculty of Biosciences, Pontifical Catholic University of Rio Grande do Sul, Porto Alegre, RS, Brazil.

Abstract

Background: The Emotional and Affective Composite Temperament (AFECT) model describes originally six traits of volition, anger, inhibition (fear and caution subordinate factors), control, sensitivity, and coping. However, fear and caution have shown opposite relatioships with criteria-variables, indicating factor independence. **Objective:** The current investigation aimed to advance in the evaluation of the psychometric properties of the emotional trait section of the Emotional and Affective Composite Temperament Scale (AFECTS) by examining the suitability of a 7-factor structure and the reliability of each scale using data from a population-based sample. **Methods:** AFECTS was administered via face-to-face assessments in a single-session, population-based cross-sectional survey. Samples was composed of teenagers and adults (14 to 35 years). The latent structure and reliability were analyzed via structural equation modeling: confirmatory factor analysis was used to test the a priori correlated 7-factor model (with fear and caution designed as single-factors) and trait-scores reliability was assessed by the estimation of information curves. **Results:** Findings attested the suitability of the 7-factor model presumed to underline the item set of the traits section of AFECTS and information curve interpretation showed adequate levels of reliability for all trait-scores. **Discussion:** The 7-factor model showed robust indicators of construct validity for the AFECTS.

Carvalho HW et al. / Arch Clin Psychiatry. 2020;47(1):25-9

Keywords: Temperament, personality, psychological traits, structuctural equation modeling, psychometrics.

Introduction

The Affective and Emotional Composite Temperament model[1] (AFECT) is a revised and expanded version of the Fear and Anger model[2,3]. Originally, the Fear and Anger model conceived temperament with two independent traits of emotional activation (drive and anger) and inhibition (fear and caution)[2,3]. This bifactor model had many implications for the understanding of psychopathology: it, in fact, anticipated a basic framework of predisposition to most mental disorders, which included a conceptual map to understand comorbidity patterns[2,3]. The vectors of activation and inhibition were also designed to tap specific neuroanatomical, neurochemical, and genetic undepinings of behavior and to inform psychopharmacological treatments[2]. Explicitly, the aim of the Fear and Anger model was to offer a conceptual framework that could inform clinical assessment and therapeutics to mental heath professionals.

Nevertheless, this bidimensional model was unable to account for neuropsychological domains keen for the understanding of emotion regulation, including the functions accountable for the modulation of activating and inhibiting behavior. The Fear and Anger model was too parcimounious to offer a comprehensive understanding of psychological adjustment trajectories in non-clinical contexts. Thus, the AFECT model[1] was developed to engender a general theory of behavior that could comprise basic motivation features (activation and inhibition) with psychological functions related to self-regulation (control), vulnerability (emotional sensitivity), and resilience (coping).

In the AFECT model,[1] activation is described by two relatively independent factors of volition and anger: The first is related to positive emotionality and positive engagement, while the second is linked to intense emotion manifestations and aggressiveness[1].

Inhibition[1] was designed as a second-order factor that accounted for the correlations between fear an caution first-order factors. Nevertheless, accumulating evidence have shown that fear and caution display opposite association with external outcome criteria: while fear is investilly associated with psychosocial adjustment patterns, caution seem to predict positive adjustment[4-7]. Thus, in this investigation, we addressed Inhibition vector as comprised by two single-factors of fear and caution: fear is thought to arises from "here and now" threaten situations and is related to freezing and flight reactions. Caution inhibits behavior by increasing attention bias to potential environment harms[1,2].

Address for correspondence: Hudson W. de Carvalho. Department of Psychology, Universidade Federal de Pelotas. Av. Duque de Caxias, 250, Fragata – 96030-001 – Pelotas, RS, Brazil. E-mail: hdsncarvalho@gmail.com

Control is conceived as a single emotional trait responsible for promoting the adaptation of one's behavior to the environment and to one's cognitive goals by modulating the levels of activation (volition and anger) and inhibition (caution and fear). Thus, it is a self- and context-monitoring dimension related to executive/frontal circuitry[1].

Sensitivity is a single trait that describes the extent to which someone is vulnerable to interpersonal and environmental stress and harm. On the other hand, coping is a single trait that aims to predict one's ability to deal positively with harmful experiences[1].

The traits of the AFECT model can be assessed using the emotional section of the Affectivite and Emotional Composite Temperament Scale (AFECTS). This section is composed of 48 self-report items that are assessed via a 7-point bipolar in Likert scale. Its validation study[1] corroborated the 6-factor model (inhibion was designed as a second-order factor with two subfactors of fear and caution) believed to underline AFECTS item set. Each factor displayed excellent level of internal consistency reliability[1]. Psychometric findings were considered to be robust once goodness of fit indexes were satisfactory and the data from a large and heterogeneous community sample was available[1].

The AFECTS underwent a process of cultural adaptation and validation to Mexico[8] using a sample of 350 participants from the general population and of 91 stable outpatients with various psychiatric diagnoses. Factor structure replicated the a priori six-factor structure with excellent levels of internal consistency reliability. Traits scores also discriminated the general population sample from the clinical one[8].

Other studies have shown that AFECTS trait scores differentiated individuals in regard to dissimilar traumatic courses[4], sexual orientation identities[5], substance use and misuse patterns[7,9], personality disorders[10], and daily energy patterns and cronotypes[11]. These findings showed that higher scores on volition, caution, control and coping were associated with more adaptative outcomes and social privilege, while higher scores on the traits anger, fear, and sensitivity were correlated with maladaptative outcomes and social vulnerability. Taken together, these findings attest positively the construct validity status of the AFECTS emotional section and indicate that fear and caution may be better understood as sigle-factors each.

Most studies using the AFECTS rely on Internet based data collection. Internet mediated studies have many advantages, such as the possibility to gather large samples at low cost or to increase data reliability when assessing sensitive issues, such as substance use or sexual behavior[12,13]. Nonetheless, some limitations are also present: samples tend to be biased to higher socioeconomic status, women, and highly motivated participants[12]. Thus, the current investigation aims to advance in the psychometric evaluation of the emotional section of the AFECTS using a representative and probabilistic samples of adolescents and adults that responded to the AFECTS via a traditional data collection methodology (face-to-face interview). As aforementioned, because fear and caution have shown opposite empirical relationships with external criteria, we tested the validity of a structural model based on 7 latent factors that allegedly underlines AFECTS item intercorrelations.

Methods

Ethics

The ethics committee of the Catholic University of Pelotas approved the protocol (ETHICS PROTOCOL: 15/2010) of the current study. Repondents agreed to participate and signed the free and informed consent form. This form was shaped to achieve the requirements of the National Health Council of Brazil (Resolution 196/1996) and the Code of Ethics of the World Medical Association (Declaration of Helsinki). Participants who were identified to have any mental disorder were assigned to a psychological and psychiatric assistance in a mental health ambulatory of the Catholic University of Pelotas with no cost.

Participants and procedures

The data set of the current study was produced by a single-session, population-based cross-sectional survey carried out in the urban area of Pelotas – a city located in the extreme south of Brazil. The target population was composed of individuals from both sexes with age ranging from 14 to 35 years.

Cluster sampling was achieved following the demographic data provided by the Brazilian Institute of Geography and Statistics (IBGE, 2008). This census divided the urban zone of the city of Pelotas into 448 sections with a target population of about 97,000 individuals aged 14-35. Out of these, 89 census sections were randomly selected and, subsequently, 2,756 residents were randomly identified. Participants were first contacted by telephone to explain the research goals, motivate participation, and schedule a data collection session. In total, 143 out of the 2,756 residents refused to take part in the study and other 265 were not found.

The resulting sample included 2,344 participants: 1,273 women (54.3% women) and 1,071 (45.7%) men. Mean age was of 24.1(SD = 6.1) years, most participants declared to be Caucasian (75.3%), single (66.7%), employed (51.9%), and to have 11.3 (SD = 3.3) years of formal education. The demographic profile of the sample is detailed in Table 1.

Table 1. Sociodemographic characteristics of the sample

		Women	Men	Total
Age	Mean (SD)	24.37 (5.99)	23.86 (6.05)	24.14 (6.02)
Ethnicity	Caucasian	976 (76.7%)	79.7 (74.4%)	1,773 (75.3%)
	Afrodescendent	169 (13.3%)	133 (12.4%)	302 (12.9%)
	Asian	06 (0.5%)	09 (0.8%)	15 (0.6%)
	Amerindian	05 (0.4%)	13 (1.2%)	18 (0.8%)
	Other	117 (9.2%)	119 (11.1%)	236 (10.1%)
Education	Basic	737 (57.9%)	589 (55.8%)	1,335 (57%)
	High-School	370 (29.1%)	319 (29.8%)	689 (86.3%)
	University	166 (13%)	154 (14.8%)	320 (13.7%)
Marital status	Single	812 (63.8%)	749 (69.9%)	1,561 (66.7%)
	Married	427 (33.5%)	306 (28.6%)	733 (31.3%)
	Widowed	33 (2.6%)	14 (1.3%)	47 (2%)
Work Situation	Yes	556 (43.7%)	660 (61.6%)	1,216 (51.9%)
	No	652 (51.2%)	373 (34.8%)	1,025 (43.7%)
	Never	65 (5.1%)	38 (3.6%)	102 (4.4%)

Trained psychologists interviewed participants individually using laptops containing an electronic version of each instrument used to collect data. The data set was encoded and then transferred to different statistical packages for data analysis. In the current investigation we used the AFECTS and the demographic questionnaire data.

The demographic questionnaire aimed to evaluate personal and social characteristics related to the sex, age, education and marital status, occupation, and other relevant information.

The AFECTS emotional section contains 48 items organized in five scales composed of 8 items (volition, anger, sensitivity, coping, and control) and two scales with 4 items each (fear and caution). The items are scored from 1 to 7 and the total score of each dimension is the sum of the scores of their respective items.[1] In the current manuscript, we did not include the analysis of the AFFECTS affective section.

Statistical analysis

All analysis were performed using Mplus version 8.3 computer package[14]. Descriptive statistics related to demographic and temperament variables are presented using frequencies for categorical data and means and standard deviations (SDs) for continuous variables. Table 2 shows descriptive statistics regarding emotional traits.

Table 2. Means and standard deviations for emotional trait scores

Emotional Traits	Women		Men		Total	
	Mean	SD	Mean	SD	Mean	SD
Volition	41.98	10.1	44.40	9.38	43.07	9.87
Anger	32.51	11.47	28.41	10.71	30.63	11.32
Fear	15.41	5.06	13.98	4.76	14.74	4.99
Caution	19.13	5.91	19.76	5.77	19.42	5.86
Control	43.11	9.72	43.46	9.77	43.26	9.77
Sensitivity	32.89	10.45	27.63	9.61	30.50	10.42
Coping	44.33	9.95	45.13	9.6	44.69	9.82

Confirmatory factor analysis was used to test the *a priori* conceptual correlated 7-factor model underlying the 48 categorical in-Likert format items that conformed AFECTS item set (fear and caution as independent factors). The weighted least square using a diagonal weight matrix with standard errors and mean- and variance-adjusted (WLSMV) estimator was used[15], because the observed indicators (i.e., AFECTS items) have an ordinal-categorical format. Parameterization theta and probit link function were used. Moreover, due to the demographic sectors from which participants were retrieved (i.e., multilevel structure), the standard errors and chi-square test of the model fit took into account such non-independence following the procedures described by Asparouhov[16,17].

To evaluate the goodness of fit of the proposed 7-factor model, the following indices were used: Confirmatory Fit Indices (CFI), the Tucker-Lewis index (TLI), and root mean square error approximation (RMSEA). The cutoff criteria used to determine the goodness of fit are described as following: RMSEA estimate values near or less than 0.06 and RMSEA's close fit (Cfit) higher than 0.05 are indicator of appropriate model fit, while CFI and TLI values near or greater than 0.95 are considered indicate good model fit[18]. It is important to point out that CFI and TLI are penalized under complex models (i.e., multidimensional models with many items per factor and various factors), and such models, as proposed here, tend to worsen as the number of variables in the model increases[19]. Then, CFI and TLI's values near to 0.9 were considered to be indicative of good fit. Important to notice that Sivo *et al.*[20], in a partial replication of Hu and Bentler's investigation[18], showed that the cut-off values for goodness of fit coefficients must be decided considering different conditions such as model structure and sample size.

In terms of factor loading's magnitude, Nunnally[21] asserts that it "is easy to overinterpret the meaning of small factor loadings, e.g., those below .40." Hence, we point estimate values for factor loadings values below 0.4 small magnitude effects.

Information curves were estimated for each factor. Trait level distribution is located at the X-axis (z-scores) and the measurement of information is at the Y-axis. Values for information are not standardized: the higher the information scores in a given part of the trait spectrum, the higher the precision/reliability of the measure and, consequently, the test ability to capture reliably individual differences in a particular spectrum.

Results

The 7-correlated factor solution generated suitable model fit coefficient values for all observed indicators. The RMSEA estimate value was of 0.04 and its Cfit was equal to 1.0. The CFI and the TLI values were of 0.933 and 0.928, respectively. Figure 1 portrays the correlated model depicting the standardized factor loading and the correlation among factors. Only one factor loading (FE3) showed a factor loading below of 0.4 (λ_{FE3} = 0.289, p-value < 0.001) which correspond a reliability (R^2 = 8.35%).

Information curves showed that trait scores had particularities. Volition, caution, control and coping displayed the highest level of information at the trait spectrum around and below mean. Fear information curve was more distributed along trait spectrum, displaying the highest information parameter ranging from the 1st SD below and the 2nd SD above the mean score, with a low decrease after the 2nd SD above mean. Anger and sensitivity highest information level were situated in between the 1st SD below and 2nd SD above the mean scores. Figure 2 depicts information curves for each factor.

Discussion

The results showed herein attest to the robustness of the AFECTS emotional section as a reliable and valid tool for assessing temperament traits. The seven-factor latent structure presumed to underline the AFECTS item set displayed satisfactory goodness of fit index values and factor loadings were moderate to high, which indicated that theoretical traits accounted for a substantial portion of its items covariance. Information curve estimations showed that AFECTS trait scores measure reliably a wide range of its theoretical constructs. Taken together, results are coherentr with the AFECT conceptual framework[1] and previous psychometric investigations of the AFECTS[1,8], with one exception: in this study fear and caution were successfully designed as first-order factors.

The division of the Inhibition into two factors of fear and caution produced a valid general solution (a 7-factor solution for AFECTS emotional scale). This division is also supported by to previus empirical data that show that fear and caution stablish opposite relatioships with criteria variables such as substance misuse[4] or traumatic experiences[6]. Moreover, fear and caution under our 7-correlated factor solution exhibited a very small standardized correlation (r = 0.285), which indicates a divergent validity between both domains.

Correlations among latent traits were also conceptually meaningful and similar in magnitude and direction to the ones reported in previous research[1,8]. Traits presumed to tap frontal functions and with desirable psychosocial adjustment content (i.e.,

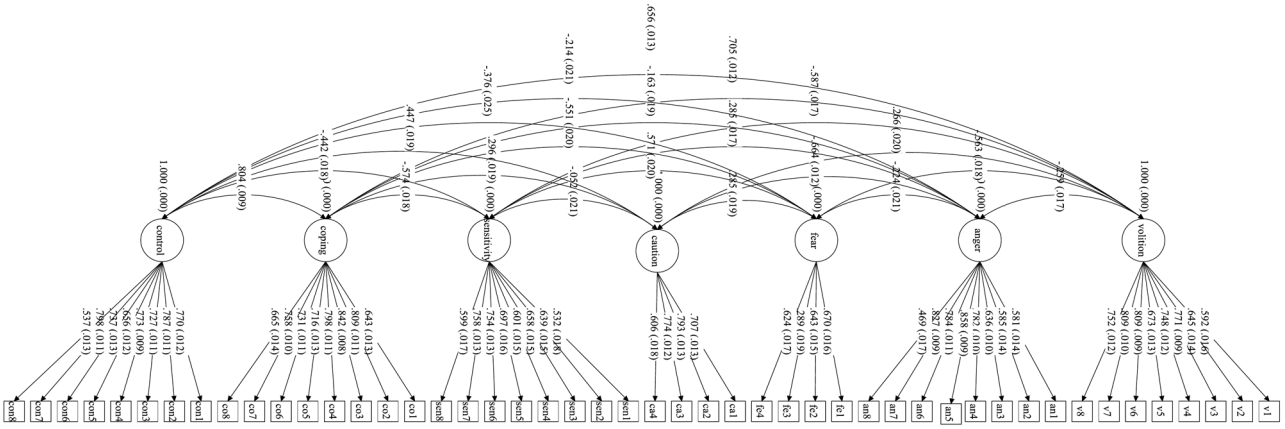


Figure 1. Seven-factor correlated model for AFECTS item set.

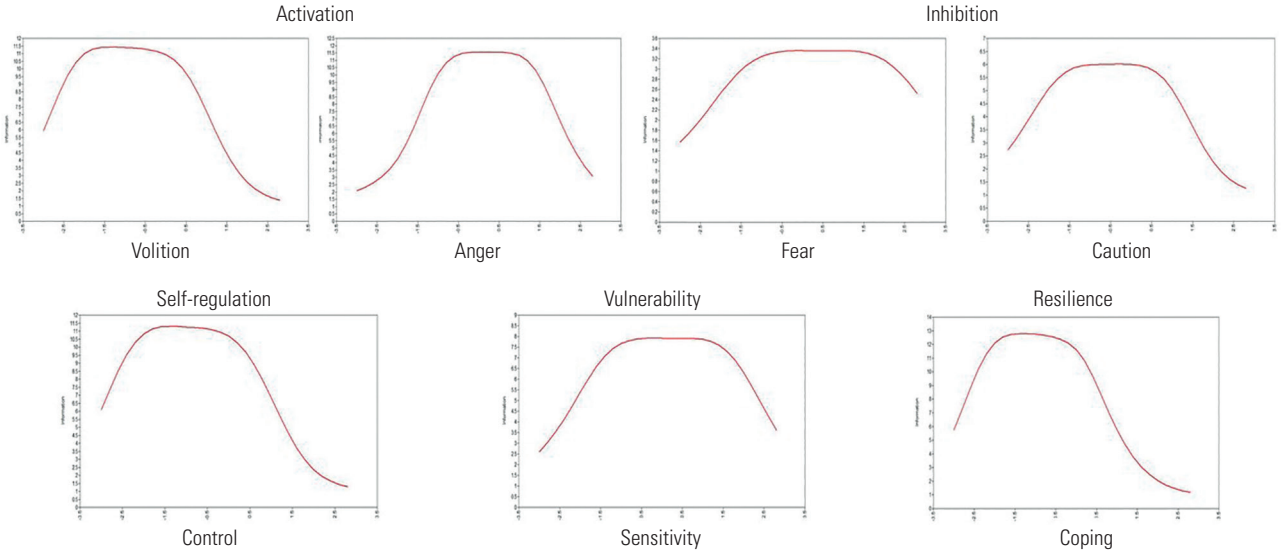


Figure 2. Information curves for AFECTS emotional traits.

volition, caution, control, and coping) displayed positive correlations with each other. Similarly, traits related to negative psychosocial adjustment content (such as anger, fear, and sensitivity) displayed positive correlations with each other. The traits fear and caution showed a small positive correlation (r = 0.28) as both may be conceived as inhibition processes: the first is associated with more innate and spontaneous reactions towards hazardous stimulations (such as freezing) and the second is related to more sophisticated processes of inhibition, based on the perception of environment cues that predict harmful events[22]. This poor empirical association and differences in function favor the understanding of fear an caution as independent factors.

Information curve analyses showed that AFECTS emotional section scores were more reliable to measure its underlying traits in individuals that are located between one to two standard deviations above and below mean. Volition, caution, control and coping are more reliable to assess individuals with average and low scores. Fear is more reliable to assess individuals located around the mean and both below and above mean scores, while sensitivity and anger are more reliable to evaluated mean and above mean scores. In general, AFECTS trait scores are less reliable to assess extreme trait manifestations: three standard deviations below and above mean score. These patterns have one particular implication: the AFECTS seem to be a reliable instrument to assess trait levels that tap the majority of the population (between 2 SDs below and above mean); which proves its reliability to evaluated normal-range temperament manifestations and individuals with subclinical or mild manifestations of various mood psychopathologies. Therefore, it is plausible to state that AFECT model offer relevant transdiagnostic variables[23].

The current research has virtues and limitations worth of mention. The main virtues are related to the adopted sampling and analytical procedures: first, a randomized population-based sample maximizes the generalization power of our findings to the strata of individual with age ranging from 14 to 35 years. Second, this is the first study that evaluated the psychometrical properties of the AFECTS emotional section in a sample of adolescents, showing that the temperament constructs purported by the AFECT model are also present at this age spectrum. Third, the use of a modern psychometric approach to test model structural hypothesis and reliability of trait scores indicate the robustness of both: the theoretical model and its measurement tool. Nevertheless, face-to-face interviews and self-report instruments also display its well-documented shortcomings[24]. Also, in this article we limited the analysis to the emotional section of AFECTS, evaluating the psychometric properties of AFECTs temperament trait assessment.

Conclusion

The current study shows the robustness of the AFECTS emotional sertion to assess temperament traits among adolecents and adults alike. The division of inhibition into two correlated factor of fear and caution yelded a stable factor solution.

Individual contributions

HWC and HC-M undertook the statistical analysis. HWC wrote the manuscript. DRL, KJ, RS, LS and JB designed the study and worked on the implementation of data collection procedures. All authors revised the manuscript.

Disclosure

The authors declare to have no conflict of interests.

Ethics

This study was approved by the committee of ethics in research from the Catholic University of Pelotas (UCPEL), under Protocol number 15/2010.

References

1. Lara DR, Bisol LW, Brunstein MG, Reppold CT, de Carvalho HW, Ottoni GL. The affective and emotional composite temperament (AFECT) model and scale: a system-based integrative approach. J Affect Disord. 2012;140(1):14-37.
2. Lara DR, Akiskal HS. Toward an integrative model of the spectrum of mood, behavioral and personality disorders based on fear and anger traits: II. Implications for neurobiology, genetics and psychopharmacological treatment. J Affect Disord. 2006;94(1-3):89-103.
3. Lara DR, Pinto O, Akiskal K, Akiskal HS. Toward an integrative model of the spectrum of mood, behavioral and personality disorders based on fear and anger traits: I. Clinical implications. J Affect Disord. 2006;94(1-3):67-87.
4. Romo-Nava F, Fresán-Orellana A, Barragán V, Saracco-Álvarez R, Becerra-Palars C, Osorio Y, et al. The Affective and Emotional Composite Temperament Scale (AFECTS): Psychometric properties of the Spanish version in a community sample from Mexico City and comparison between remitted psychiatric patients. J Affect Disord. 2015;172:251-8.
5. Sudbrack R, Manfro PH, Kuhn IM, de Carvalho HW, Lara DR. What doesn't kill you makes you stronger and weaker: how childhood trauma relates to temperament traits. J Psychiatr Res. 2015;62:123-9.

6. Guerrin LD, de Carvalho HW, Lara DR. The relationship between temperament and sexual orientation. J Affect Disord. 2015;175:379-84.
7. Fuscaldo LV, Bisol LW, Lara DR. How emotional traits and affective temperaments relate to cocaine experimentation, abuse and dependence in a large sample. Addict Behav. 2013;38(3):1859-64.
8. Leite L, Machado LN, Lara DR. Emotional traits and affective temperaments in alcohol users, abusers and dependents in a national sample. J Affect Disord. 2014;163:65-9.
9. Mombach KD, de Souza Brito CL, Padoin AV, Casagrande DS, Mottin CC. Emotional and Affective Temperaments in Smoking Candidates for Bariatric Surgery. 2016. PLoS One. 2016;11(3):e0150722.
10. Lara RD, Ottoni GL, Bisol LW, Carvalho HW. The integration of mood, behavior, and temperament in mood spectrum disorders. In: Chi-Kain LW, Gunderson JG, Orgs. Borderline Personality and Mood Disorders. 1st ed. New York: Springer; 2015; p. 133-54.
11. Ottoni GL, Antoniolli E, Lara DR. Circadian Preference Is Associated With Emotional and Affective Temperaments. Chronobiol Int. 2012;29(6):786-93.
12. Lara DR, Ottoni GL, Brunstein MG, Frozi J, de Carvalho HW, Bisol LW. Development and validity data of the Brazilian Internet Study on Temperament and Psychopathology (BRAINSTEP). J Affect Disord. 2012;141(2-3):390-8.
13. Birnbaum MH. Human research and data collection via the internet. Ann Rev Psychol. 2004;55:803-32.
14. Muthén LK, Muthén BO. Mplus User's Guide. 8th ed. Los Angeles, CA: Muthén & Muthén; 1998-2018.
15. Muthén B, du Toit SHC, Spisic D. Robust inference using weighted least squares and quadratic estimating equations in latent variable modeling with categorical and continuous outcomes [Unpublished manuscript]. Los Angeles, CA: College of Education, UCLA; 1997.
16. Asparouhov T. Sampling Weights in Latent Variable Modeling. Struct Equ Modeling. 2005;12(3):411-34.
17. Asparouhov T. General multi-level modeling with sampling weights. Communications in Statistics – Theory and Methods. 2006;35(3):439-60.
18. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives Struct Equ Modeling. 1999;6:1-55.
19. Kenny DA, McCouch DB. Effect of the Number of Variables on Measures of Fit in Structural Equation Modeling. Struct Equ Modeling. 2003;10:333-51.
20. Sivo SA, Xitao Fan E, Witta L, Willse JT. The Search for "Optimal" Cutoff Properties: Fit Index Criteria in Structural Equation Modeling, J Exp Educ. 2006;74: 267-88.
21. Nunnally J. Psychometric Theory. New York, NY: McGraw-Hill; 1967.
22. Sylvers P, Lilienfeld SO, LaPraire L. Differences between trait fear and trait anxiety: Implications for psychopathology. Clin Psychol Rev. 2011;31(1):122-37.
23. Patrick CJ, Rajcak G. RDoC: Translating promise into progress. Psychophysiology. 2016;53(3):415-24.
24. Conrad GF, Schober MF. New forntiers in standardized survey interviewing. In: Hesse-Biber SN, Leavy P. Handbook of Emergent Methods. 1st ed. New York: The Guilford Press; 2008.

Letter to the editor

Levetiracetam induced mania – A case report

João B. Fonseca[1,2]
https://orcid.org/0000-0001-6024-8153

Rosa Rodrigues[1]
https://orcid.org/0000-0003-2029-2971

Esmeralda Lourenço[2]
https://orcid.org/0000-0001-7947-9146

Pedro Morgado[2-4]
https://orcid.org/0000-0003-3880-3258

[1] *Hospital "Senhora da Oliveira", Guimarães, Portugal.*
[2] *Hospital of Braga, Braga, Portugal.*
[3] *Life and Health Sciences Research Institute (ICVS), School of Medicine, University of Minho, Braga, Portugal.*
[4] *ICVS-3Bs PT Government Associate Laboratory, Braga/Guimarães, Portugal.*

Received: 05/22/2019 – **Accepted:** 08/12/2019
DOI: 10.1590/0101-60830000000226

Fonseca JB et al. / Arch Clin Psychiatry. 2020;47(1):30

Dear Editor,

Levetiracetam is an anti-epileptic second generation drug with a unique mechanism of action involving the modulation of neuronal vesicle exocytosis[1]. Alongside its indication for partial epilepsy, it has been proposed as mood stabilizer in both manic and depressive phases in bipolar disorder. Although its favorable side effects profile, up to 16% behavioral signs like agitation and aggression may occur. Manic symptoms were already reported in two papers, seeming to be a rare yet possible secondary consequence of this agent[2,3]. We report a case of a levetiracetam-induced manic episode in a 58-year-old male without previous psychiatric history.

A 58-year-old Caucasian male with a medical history of epilepsy since infancy was admitted to Neurology ward for uncontrolled epileptic seizures. He was under phenobarbital 100 mg, valproic acid 1,500 mg and hidantine 300 mg daily treatment. The patient had no prior personal or family history of mental health problems. Valproic acid was stopped and levetiracetam was initiated and augmented till 3,250 mg/d.

Two weeks after discharge, the patient started presenting irritability, restlessness, increased psychomotor activity, decreased need for sleep, socially disinhibited behavior, intrusive contact with strangers and excessive shopping. One month later, he was admitted to our psychiatry emergency. As no relevant alterations were found on complete imagological and analytic workup, a diagnosis of manic episode was established. He was prescribed with quetiapine 250 mg/d and levetiracetam to 2,000 mg/d with frankly remission of the symptoms in 2 weeks.

Manic episodes are usually related with bipolar disorder but can be triggered by other disorders[4] or substances. Therefore, the temporal sequence of events, the age of patient, the absence of other concomitant medications (corticosteroids, antihistaminic and antidepressants), the negative history of past psychiatric history or substance use strongly suggests that the manic episode was induced by levetiracetam. Due to its growing use in the clinical field, physicians must be aware of possible mood symptoms and behavioral disturbances such as mania that may occur secondarily.

This study was performed in accordance with the provisions of the Declaration of Helsinki 2008 and was approved by the Ethics Committee of Hospital of Braga. We obtained informed written consent from the patient authorizing publication. His anonymity has been preserved.

Financial support

Nothing to report.

Consent

An informed consent was obtained from the patient.

Disclosure statement

The authors report no conflicts of interest.

References

1. Lyseng-Williamson KA. Levetiracetam: a review of its use in epilepsy. Drugs. 2011;71(4):489-514.
2. Ozcan H, Ulkevan T, Ustundag MF, Yucel A. Levetiracetam-induced acute mania. Bull Clin Psychopharmacol. 2015;25:319-20.
3. Park EM, Holmes JA, Reeder-Hayes KE. Acute mania associated with levetiracetam treatment. Psychosomatics. 2014;55(1):98-100.
4. Morgado P, Mendonca-Goncalves M. Acute mania induced by hypothyroidism in a male patient after thyroidectomy. J Neuropsychiatry Clin Neurosci. 2016;28(1):e21-2.

Address for correspondence: Pedro Morgado. Life and Health Sciences Research Institute, University of Minho. Campus de Gualtar – 4710-057 – Braga, Portugal. Telephone: +351253604931.
E-mail: pedromorgado@med.uminho.pt