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Original article

Response to venlafaxine on EEG in unmedicated bipolar depression: which entropy, up or down?

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SUMMARY

Objective

We examined changes in the entropy area in bipolar depression patients at baseline and at the end of the first hour following per oral 75 mg venlafaxine intake.

Methods

For this purpose, 10 patients diagnosed with bipolar disorder type I, depressive episode according to DSM-5, who applied to our outpatient unit and gave voluntary consent for our study were evaluated consecutively. EEG was taken at the end of the first hour following basal and per oral 75 mg venlafaxine intake. Different entropies were calculated by transferring the last sample digital data with EZ-Entropy software. EZ-Entropy software is a free distributed program that automatically and also user friendly calculates entropy. It basically works via the MathLab interface.

Results

Four entropy types among seven types of entropies are increased (ApEn, SampEn, FuzzyEn, PemEn), while three entropy types decreased (DistEn, CEn, SDEn). All these mean entropy changes in increases and decreases were statistically significant under paired samples t-test correlation results.

Conclusions

Pathologies thus seem to reduce the brain's adaptation ability to response stimuli, or in other words make the brain less prone to deviate from equilibrium. This is nevertheless not homogeneous.

Key words: entropy, bipolar depression, venlafaxine

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Introduction

Mood disorder is an irregularity between slow and fast wave activity. It has been suggested that the relationship between slow and fast wave activity reflects cortical and subcortical interactions, including emotion processing [1]. Another component of this process is attention. As a matter of fact, it was defined as "mood regulation capacity index" in the fMRI findings showing the cotico-subcortical coupling between the amygdala and the frontal cortex. An increased delta-beta coupling in the frontoparietal region means better executive function, such as an increased inhibitory control and healthy decision-making processes [2]. In bipolar cases, these functions are disabled [3]. On the other hand, previous studies have found entropy lower than healthy controls, not only bipolar cases, even they ve found lower entropy in theirs families [4]. As a matter of fact, bipolar cases have a more rigid structure, they cannot easily show flexibility, whether they use coping strategies, their motivation and ability to change the environment.

The ability to produce a quality alpha wave is associated with the individual's affective repertoire. Brain operates phase synchronizations in healthy

processes in the same way. i) in situations that develop suddenly; ii) in situations that stimulate past memories; iii) in decision making processes. Moreover, under normal circumstances, it tends to consistently create these phase synchronizations. Chaos occurs when entering and exiting these synchronizations due to brain ability to adapt and function in continuously changing conditions. Brain shows the entropy changes due to these transitions with emanating larger instantaneous entropy values.

Completely random distribution and complexity nature has maximum entropy [5]. Aging or diseased status usually emanates with reduced entropy values within the dynamics of physiological structure. The physiologic signals from a healthy system should exhibit a higher complexity value than a pathologic and aging system [6,7]. There are different entropy measures to quantify the complexity.

It has been repeatedly demonstrated in various studies that serotonin noradrenaline reuptake inhibitors are more effective agents on bipolar depression [8]. In bipolar depression, the antidepressant effect should be a decrease in both slow and fast wave activity. The aim of this study is to investigate this change in the field of entropy. We examined changes in the entropy area in bipolar depression patients at baseline and at the end of the first hour following per oral 75 mg venlafaxine intake.

Methods

Sample

For this purpose, 10 patients diagnosed with bipolar disorder type I, depressive episode according to DSM-5, who applied to our outpatient unit and gave voluntary consent for our study were evaluated consecutively. Patients, receiving preventive treatment or any treatment for the current depressive episode were excluded.

The average age of 6 women, 4 men, as total 10 patients is 35.8 ± 7.6 and the duration of the disease is calculated as 8.4 ± 4.1 years.

Assessment tool

EEG was taken at the end of the first hour following basal and per oral 75 mg venlafaxine intake.

EEG and entropy analysis

Nine minutes of analog EEG (sample rate 125 Hz/second) was taken before and after medication. EEGs were cleared of possible artifacts. Analog EEG data was converted to digital with EDFBrowser Ver 1.7. This digital data was downsampleed from 125 Hz to 25 Hz due to the import limitation of the entropy analysis software program. After the downsample of original analog EEG, 12.400 lines of digital data were obtained from the 8.3-minute EEG sample. In this way, an EEG sampling was made in 40 msec as 25 Hz. Different entropies were calculated by transferring the last sample digital data with EZ-Entropy software. EZ-Entropy software is a free distributed program that automatically and also user friendly calculates entropy. It basically works via the MathLab interface, but standalone can work [9].

Seven different entropy types (approximate [ApEn], sample [SampEn], fuzzy [FuzzyEn], conditional [CEn], permutation [PerEn], distribution [DistEn] and sparsity density entropy [SDEn]) were calculated automatically with EZ-Entropy software before and after drug administration from the sampled EEGs. In the analysis of enthalpies, embedding dimension 2 and time delay 1 were taken. For ApEn, SampEn and FuzzyEn, the threshold value of 0.2XSD was taken. For DistEn, bin number 256 is accepted. For CE, quantification level 6 was accepted.

Statistically analysis

The entropy values obtained for different brain regions (frontal, temporal, parietal, occipital and vertex) and left-right hemispheres were compared with the paired sample t-test.

Results

As shown in Table I, seven different entropy type drugs were calculated before-after application. The mean differences over 10 patients between premedication and postmedication periods are calculated for each of seven different type of entropies. Four entropy types among seven types of entropies are increased (ApEn, SampEn, FuzzyEn, PemEn), while three entropy types decreased (DistEn, CEn, SDEn). All these mean entropy changes in increases and decreases were statistically significant under paired samples t-test correlation results.

As shown in Table I, it was determined that there was no statistically significant difference especially in DistEn ($r = 0.10$ and $p = 0.214$) and CEn entropy methods(for pre and post medication periods, $r = 0.150$ and $p = 0.06$).Whether or not the statistically significant change in mean value of entropies over 10 patients is an indirect indicator of treatment efficiency which is an indication that the drug administered has not changed the conditions. From this point of view, ApEn ($r = -450$ and $p = 0.001$), SampEn ($r = -32$ and $p = 0.001$), FuzzyEn ($r = -0.370$ and $p = 0.001$), PermEn ($r = -0.25$ and $p = 0.002$) and SDEn ($r = 0.240$ and $p = 0.003$) continued to a certain degree with moderate or apparent positive-negative statistical significance. This can be taken as an indirect indication that the change of mean entropy values between pre and after drug administration is not distinct or reveal subtle differences.

On the other hand, different type of entropy values were analyzed based on mean entropy change between premedication and post-medication periods in the cer-

TABLE I. *In the whole brain before and after paired samples t-test correlation (n = 10).*

	Mean	Mean difference	Std. deviation	Std. error Mean	Paired sample t-test, *t*	Paired sample t test, *p*	*Correlation, r*	*Correlation p-value*
ApEnPre	1.843		.3358	.0272				
ApEnPost	1.972	-.128959	.1151	.0093	-3.962	*0.001*	-.453	*.001*
SampEnPre	1.573		.4151	.0336				
SampEnPos	1.730	-.156938	.1869	.0151	-3.811	*0.001*	-.326	*.001*
FuzzyEnPre	1.227		.2869	.0232				
FuzzyEnPos	1.330	-.103119	.1547	.0125	-3.405	*0.001*	-.373	*.001*
DistEnPre	.6670		.1070	.0086				
DistEnPos	.6250	.042196	.1183	.0096	3.488	*0.001*	.101	***.214***
PermEnPre	2.568		.0364	.0029				
PermEnPos	2.582	-.013828	.0028	.0002	-4.577	*0.001*	-.252	*.002*
CEnPre	.9844		.4903	.0397				
CEnPost	.8790	.105027	.5522	.0447	1.902	*0.050*	.152	***.062***
SDEnPre	.3871		.1170	.0094				
SDEnPost	.3393	.047740	.1142	.0092	4.132	*0.001*	.242	*.003*

ebral lobes (frontal, temporal, parietal, occipital, vertex) individually. Accordingly, the most obvious changes in entropy were observed in the frontal lobe.Total entropy of frontal electrodes ApEn (mean difference [MD] = -0.565 and p = 0.017), SampEn (MD = -0.179 and p = 0.027), FuzzyEn (MD = -0.122 and p = 0.042) and PermEn (MD = -0.0153 and p = 0.013) were significantly increased. By the contrary, DistEn (MD = 0.0379 and p = 0.105), CE (MD = 0.046 and p = 0.599) did not reveal any significant change in the frontal region. Moreover, SDEn entropy decreased significantly (MD = 0.0482 and p = 0.030).

Entropy changes in other cerebral lobes mostly changed on a single electrode basis. Accordingly, only the ApEn (MD = -0.151 and p = 0.054) and SampEn (MD = -0.192 and p = 0.051) in the temporal lobes revealed a statistically significant change.When the parietal lobe electrodes were analyzed, only a significant entropy reduction was detected in SDEn (MD = 0.064 and p = 0.027) type entropy. When looking at the mean entropy change in vertex electrodes, DistEn (MD = 0.046 and p = 0.039) increased, while PermEn (MD = -0.013 and p = 0.019) and SDEn (MD = 0.048 and p = 0.041) were decreased. As an interesting finding, no change in entropy type was observed in the occipital region electrodes after drug administration.

Seven different types of entropy changes were compared between the right hemisphere related to emotions and the left hemisphere related to cognition (Tab. II). Accordingly, after drug administration, especially in the right hemisphere, Entropy (ApEn), SampEn which has data length independence, Fuzzy Entropy (FuzzyEn) and Permutation Entropy(PermEn) statistically significant increase entropy was observed; A decrease in DistEn, cross-entropy (CE) and SDE methods was detected, but these reductions were not statistically significant changed. In the left hemisphere, there was a change in all entropy methods except CE A statistically significant increase was detected in ApEn, Sample Entropy (SampEn), Fuzzy En and PermEn. On the other hand, while statistically significant decrease was observed in DistEn and SDEn entropies, it did not show a significant change despite the decrease in cross-entropy (CE) method.

Discussion

In our study, at the end of the first hour following PO 75 mg venlafaxine intake, we observed a relative change in the entropy areas of the whole brain. Sparsity / density entropy showed a significant difference between pre and post-medication, while pre and post-medication correlation coefficients differed from each other. We interpret that that there is an increase in chaos. Chaos is a spread over in the widest spectrum, in the range of 0.1-70 Hz. In other words, it is a degree of growth rate in phase space. During chaos stage transition, periods of small frequencies doubling over large periods of fre-

quencies and periods of large frequencies over small frequencies vice versa. This happens in smoothly mixing for a short time. The prolongation or shortening of the chaotic transitions may reveal a disorder.

From application of the seven different type of entropy methods, we performed EEG data before and after Venlafaxine drug administration. We obtained results that may appear inconsistent when viewed superficially. There are different types of entropy approaches, and the mathematical algorithms to calculating these entropies are different from each other. It can be said that while some entropies increase in certain brain lobes or hemispheres, other methods decrease due to differences in basic mathematical assumptions used in entropy analysis rather than inconsistency. In relation to this, in many neurological and psychiatric diseases, different entropy analyzes do not indicate a consistent decrease or increase. For example, while Sample Entropy (SampEn) increased in EEG analysis in Parkinson's disease, ApEn increase was detected in EEG- electrophysiological recordings of globus pallidus internus.Approximate Entropy and Sample Entropy are two algorithms for determining the regularity of EEG data based on the assumptions for the existence of patterns must be known apriori [10]. Theoretical ideas behind those seven type of techniques are different. Even though all seven Entropy methods aim to measure of the amount of uncertainty associated with a given variable (EEG time series on electrodes) but only its distribution of structural changes in the temporal region must be known as an assumption.Moreover, even though those of entropy equations are useful for deterministic processes, small amounts of noise make them very sensitive for chaotic EEG data.

Although increased entropy value is generally associated with a disorder, disorder, or a diseased condition whereas the decrease in entropy is linked to order and well-being. However, there is always an irregularity in nature, and this is a general trend which is the common rule in breathing, physiological increments and brain waves. Outliers in entropy values can be directly related to the disease itself. In this study, the increase or decrease in some types of entropy values can cause illusion in the form of anticipated entropy reduction with the well-being of antidepressant. This expectation is probably based on the preliminary acceptance based on both physical-spiritual order, creativity and their electrophysiological responses reflections are associated with the increase in entropy values. On the other hand, a decrease in entropy may also be an indicator of poor health. Physiological and mental health status are also in duplicate with the ability to create a flexible response that can vary with environmental stimuli. Inelasticity, rigidity or loss of chaotic dynamics of oscillations among neuron populations may be an indication of the diseased state. In some cases, moving away from pure order may cause the symptoms of the disease to be relieved as a clinical appearance.

On the other hand, the entropy decrease occurs in epilepsy disease is such an example. In some epilepsy patients, when seizure control is clinically and electrophysiologically excellent, the psychotic picture may appear. The way to correct psychosis is to reduce the medication of patients with this condition to such an ex-

TABLE II. *Comparison of entropies before and after in right hemisphere-left hemisphere.*

			Paired differences		t	Sig. (2-tailed)
			Mean	Std. deviation		
Right hemispheric electrodes	Pair 1	ApEnPre - ApEnPost	-.140329	.421113	-2.666	**.010**
	Pair 2	SampEnPre - SampEnPost	-.162347	.516499	-2.515	**.014**
	Pair 3	FuzzyEnPre - FuzzyEnPost	-.107468	.379059	-2.268	**.027**
	Pair 4	DistEnPre - DistEnPost	.034550	.148214	1.865	.067
	Pair 5	PermEnPre - PermEnPost	-.014131	.039323	-2.875	**.006**
	Pair 6	CEnPre - CEnPost	.069534	.639844	.869	.388
	Pair 7	SDEnPre - SDEnPost	.033440	.134765	1.985	.056
Left hemispheric electrodes	Pair 1	ApEnPre - ApEnPost	-.118707	.398328	-2.384	**.020**
	Pair 2	SampEnPre - SampEnPost	-.152768	.516954	-2.364	**.021**
	Pair 3	FuzzyEnPre - FuzzyEnPost	-.098316	.380829	-2.065	**.043**
	Pair 4	DistEnPre - DistEnPost	.048758	.151903	2.568	**.013**
	Pair 5	PermEnPre - PermEnPost	-.014053	.037310	-3.013	**.004**
	Pair 6	CEnPre - CEnPost	.146388	.700102	1.673	.099
	Pair 7	SDEnPre - SDEnPost	.064122	.138473	3.705	**.000**

tent that mild EEG disorder occurs [7]. In other words, it aims to compensate clinical reflection by allowing entropy increase change in EEG with same amount of reduced entropy change. Another condition on increase of entropy associated with the disease is caused by the decrease or loss of cardiac RR variability (entropy) that occurs in diabetic autonomic neuropathy. People who normally experience RR variability die 5 years earlier. Another situation is the detection of decreased AppEn and SampEn, which occurs in the case of cognitive impairment in Alzheimer's disease [11].

According to our findings, at the end of the first hour following PO 75 mg venlafaxine intake, the change in the relative entropy, in other words, the increase in chaos, occurred significantly in the frontal lobes and also right hemisphere. Du et al. showed a relationship between Sample Entropy (SampEn) and cognitive impairment in Fp1 and Fp2 that spread over to theta, alpha, beta and gamma frequencies in their study with schizophrenia cases [12]. The first in our two findings is that depressive symptoms evolve into mixed features, which our patients expressed as a subjective sense of tension and increased psychomotor activity, the second finding is that the frontoparietal network had a more dominant role.

In our previous study, we showed that an increased delta-beta coupling in the frontoparietal region which means a better executive function, like an increased inhibitory control and healthy decision-making processes [2]. Indeed, in both schizophrenia and bipolar disorder, entropy decreases during task performance, regardless of pharmacological treatment and structural connectivity [13].

The emergence of mixed symptoms in the form of increased psychomotor activity can be interpreted as a compensating effort during the depressive period, which can be defined as a condition in which hemostasis is disturbed in other words. It will be determined by the temperamental factors to which point it plays a compensatory role and at what point it is a sign of disease. In our cross-frequency coupling (CFC) studies, we found this situation as both a trait and mixed symptoms to cope with depressive symptoms and we found those symptoms as a state that defines mixed symptoms [2]. Mixed symptoms, often occurring in the form of increased psychomotor activity, seem to be a positive feature in depression, such as increased energy in the short term and improvement in cognitive function, but mixed symptoms in longitudinal course are not desired. The mixed period, considered a manic shift counterpart, is associated with an increased risk of suicide and an increase in cycle frequency. As a matter of fact, Areteus stated before 150 BC: "It seems to me that mania is a more severe form of depression following depression".

The propagation of wide range of frequencies at period doubling and chaotic regions of the brain introduces infinite possibilities associated with higher entropy growth. This entropy growth during the chaos is directly proportional to the homogeneity of this spread until a stability region of the fixed point as entropy increases and stops. This increase is directly proportional to the homogeneity of this spread. On the contrary to the density of the scrambled egg at different points as an analogy, we understand how well the egg is whipped and how homogenized it is from the relative increase in entropy. For any psychiatric disorder, the relative change of entropy at any time interval may be another biomarker.

Yanbing et al. (2012) in his study including fMRI signals, sample entropy (SampEn) of the patients characterized for schizophrenia while performing a social exclusion task was higher than healthy controls [14]. EEG signals from patients with Parkinson disease (PD) showed higher entropy in the frequency domain at resting state [15]. Higher neuronal entropy in the globus pallidus interna involved in the regulation of voluntary movement has been reported in the patients with Parkinson Disease [9]. Apomorphine, induce a decrease in entropy measured in the inter spike intervals of subthalamic nucleus. Zanin et al. (2019) compared patients with schizophrenia, Parkinson and epilepsy with permutation entropy (PermEn) in terms of time irreversibility [16]. Evoked Potential responses changed timeseries in patients with schizophrenia and Parkinson's disease, but remained stable in epilepsy cases. Using Approximate entropy (ApEn) and SampEn showed reduced complexities in EEG signals for Alzheimer disease (AH) have been reported [17,19].

The complexity of EEGs at different time scales might represent smaller and larger scales in network connectivity of the brain in AD patients. The neurophysiological mechanism underlying the contradiction between decreased EEG complexity across fine scale factors (shorter time scales) and increased complexity (entropy) at coarser scale factors (longer time scales) for severe Alzheimer Disease patients globally across brain regions remains not clearly understood in characterizing both short and long range temporal correlation dynamics.

Consequently, relative entropy change should not be considered as a simple increase or decrease in diseases such as Parkinson, Alzheimer's, schizophrenia and bipolar disorder. Instead, the observed abnormalities in behavioral patterns reflect a quantifiable dysregulation and disorganization of these functions at different in short and long range scales in hierarchical organization of the brain.

Neurons have a collective behavior. This behavior takes place at the mesoscopic level. An event that takes place at the microscopic level is not projected linearly on the mesoscopic level. Chaos lies in the dynamics of the

collective behavior of neuron populations. The chaotic dynamics of the brain is reflected in mood, decision-making processes and creativity. At this point, a question like which electrode and which region is not very meaningful. Mesoscopic level dynamics behavior also warps large scale macroscopy behavior of the brain which reflects in an extension of the relative entropy change. In other words, the law of the whole/universe is not explained linearly through scales with changing spatio-temporal dimensions. The brain complexity is of same level as Universe complexity. Pathologies thus seem to reduce the brain's adaptation ability to response stimuli, or in other words make the brain less prone to deviate from equilibrium. This is nevertheless not homogeneous.

The small number of the samples considered in this study limits its statistical power. The lack of a control group is another limitation. On the other hand, it is an important advantage that the cases are based on non-drug cases. This is also raising a question of whether chaos has anything to tell us about relative entropy change which states are the not likely to be observed in different diseases. In future, subsequent studies should aim at different periods of the disease with a higher number of cases, comparing the same patients in different longitudinal periods in order to explain temporal dynamics at longer scales.

Ethics approval and consent to participate publication

The Institutional Review Board of Uskudar University approved the study. QEEG is a routine evaluation tools in our NPİstanbul Brain Hospital outpatient clinic. Patients gave written informed consent in accordance with the Declaration of Helsinki.

Consent for publication

Patients gave written informed consent for publication.

Data availability statement

All data and material archived at our institution according to Information and Consent Form on processing and protection of Personal Data.

Conflict of interest

The Authors declare no conflict of interest.

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Authors' contributions

Sermin Kesebir conceived and designed the experiments, performed the experiments, analyzed and interpreted the data with Sultan Tarlacı, Rüştü Murat Demirer and Nevzat Tarhan. She wrote the paper.

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Original article

COVID-19 Intensive Care Unit: the emotional experience of family members

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SUMMARY

Objective

This study describes the psychological counseling offered to family members of SARS-CoV-2 patients in an intensive care unit (ICU). The purpose of this study is to describe the emotional burden experienced by families, and describe the first contact and counseling services.

Methods

Family members of patients admitted to the IRCCS ISMETT COVID-19 ICU were contacted by telephone by the IRCCS ISMETT Clinical Psychology Service. After this first contact, the families who accepted the service were offered periodical counseling by the psychologists. The clinical psychological interview was used to manage and support their emotional burden. The stress thermometer was used as a tool to assess the stress experienced by the family members, who were followed by the psychology team until the patient was discharged or transferred to another hospital, or until his or her death. A follow-up telephone psychological counseling was planned six months after the patient's discharge.

Results

We contacted 60 family members of patients admitted to the IRCCS ISMETT COVID-19 ICU. Of these, 23 accepted the telephone psychological counseling. The level of perceived stress of family members was high (M 7 DS 1.6). The main cause of distress was described as related to an emotional issue (fear, depression). Family members were encouraged to manage the emotional burden and supported at the time of the patient's discharge or death.

Conclusions

Our experience with telephone psychological counseling for family members of COVID-19 ICU patients highlights the emotional burden of families and the importance of this service. Our study encourages additional research on the post-traumatic sequelae of family members forced to deal at a distance with the hospitalization of a beloved one, and suggests the need for a patient- and family-centered model of care, even during a pandemic.

Key words: COVID-19 pandemic, psychological support, family members

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Introduction

The importance of the family caregiver in the clinical setting has long been recognized for the fundamental role of supporting patients with complex clinical conditions and helping patients to adapt to their path of care. The patient-centered model of care [1] places not only the patient but also the family member at the center of care. The World Health Organization (WHO) encourages to keep family members constantly informed and involved in the patient care process, and recognizes their emotional burden and psychological needs [2]. Indeed, health systems are committed to identifying strategies to encourage and facilitate the active and participatory role of family members in the clinical management of the patient [3-6]. This applies in particular to family members of critically-ill patients admitted to the ICU.

ICU patients are often unconscious patients losing most of their communication skills. This forces family members to deal with a strong physical and emotional detachment that over time determines high levels of stress, leading them to experience forms of anticipatory mourning related to the prolonged absence of their loved one.
Family members of ICU patients often present psychological symptoms such as anxiety and depression that can lead to real traumatic experiences, recently described with PICS-F (Post Intensive Care Syndrome Family) [7-12].
In the last several years, studies on the psychological sequelae of long-term ICU patients have been extended to include the emotional effects not only on patients, but also on their families. These considerations are intended to describe the variety of symptoms and disorders related to the critical clinical conditions of the loved one (Family Intensive Care Unit Syndrome) and to identify paths to support family members and prevent similar relapses [13,14].
To this regard, attempts have been made to identify strategies for the care and active involvement of family members of patients admitted to the ICU [15]. Furthermore, recent scientific evidence associates a better adaptation of family members of ICU patients to an improved post-discharge patient management by family members during home care [16].
One of the strategies to improve the emotional burden of family members is attention to communication [12,17-19].
The advent of the SARS-CoV-2 pandemic and social distancing and isolation regulations, have further complicated the emotional burden of relatives of critically-ill ICU patients. Furthermore, the spread of COVID-19 and the severe respiratory complications reported by some patients who contracted the virus, forced many hospitals to open dedicated intensive care units for critical COVID-19 patients. The traumatic experience and the psychological repercussions of this new patient population is the subject of many studies that increasingly extend the range of observation to include family members. In particular, families of patients admitted to a COVID-19 ICU experience the strong emotional distress associated with the critical clinical condition of their loved one, amplified by the social resonance of the COVID-19 infection. Also, these family members have no physical contact with the patient or with the hospital, resulting in an experience of loneliness/abandonment that contributes to worsening their emotional burden [20-22].
This study describes the psychological support provided to a group of family members of COVID-19 ICU patients. In addition to describing the emotional experience of these family members, our goal was also to describe the attempt to maintain a model of care centered on patients and their families, even during the SARS-CoV-2 pandemic and with a particular complex patient population.

Methods and tools

Since October 2020, part of ISMETT's intensive care unit has been reorganized to treat patients with severe complications from SARS-CoV-2 infection. The data in this study refer to patients admitted to ISMETT's COVID-19 ICU between October 20, 2020 and February 2, 2021. During this time, the patients who required intensive care were 62 (10 females and 52 males).
Upon their admission in the COVID-19 ICU, these patients' clinical conditions were severe and most of them required intubation and deep sedation.
In addition to managing the COVID-19 patients, the entire clinical staff focused on communication with the families to create a feeling of trust and support, acknowledging their emotional burden.
In this context, the ISMETT Clinical Psychology Service activated a telephone counseling service for family members of COVID-19 ICU patients.
The Psychological Counseling Service was organized as follows (Fig. 1):
After COVID-19 patients were admitted to the ICU, the caregivers were contacted by the ISMETT psychologists. The purpose of this initial meeting was to contain the emotional burden of the family member and illustrate the telephone counseling service.
After the first contact, and based on the emotional needs of the family, follow-up telephone psychological counseling was initiated. The goal of telephone counseling was to assess the emotional burden of the family member (through a clinical interview and periodic administration of the stress thermometer) and provide strategies to contain and manage the emotional burden. Families were followed by the Psychology Service until their loved one was discharged from the hospital.
Six months after discharge, a psychological follow-up was arranged in a family setting, to assess the potential conditions of psychological distress.
One of the psychologists' tasks with family members was to support them in the process of caring for the critically-ill patients and helping them deal with the patient's clinical complexity. After the initial moment of shock and anger [23], family members had to face the prolonged emergency condition and the physical absence of the family member, while trying to readjust, albeit temporarily, to their normal everyday life (work, school, etc.). A form of pre-loss bereavement was identified in a significant number of family members, which in some cases lasted for weeks or even months [24]. This condition is understandably related to high stress levels linked to prolonged alert levels.

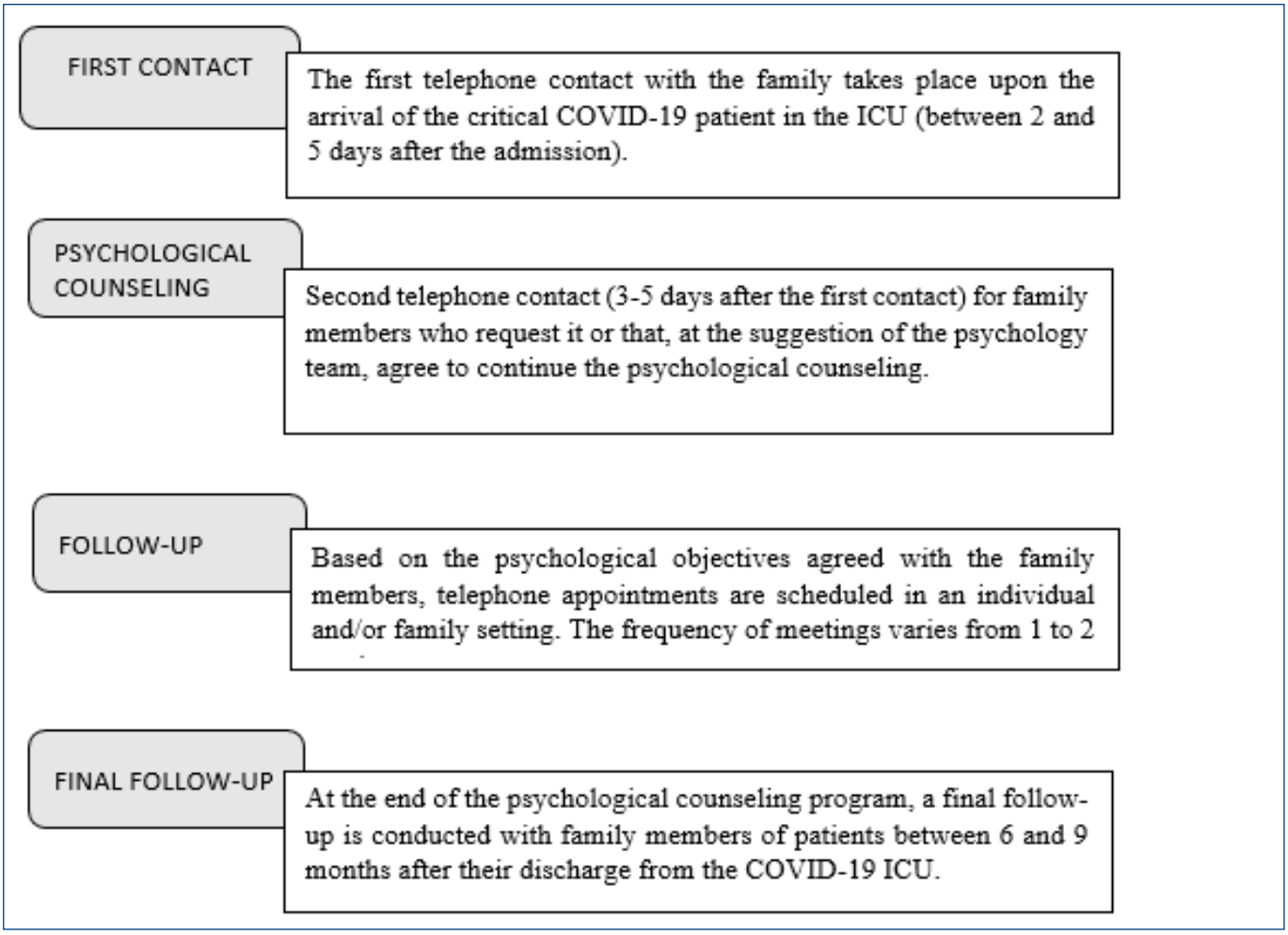

FIGURE 1. *Psychological counseling with family members of COVID-19 ICU patients.*

Tools

The main tool was the clinical interview in the context of psychological support and emotional containment.

The psychological interview is a critical evaluation procedure commonly used in mental health practice that involves, through the creation of a favorable relational context, collecting and using the necessary information for diagnosis and treatment [25].

During the telephone counseling, unstructured psychological interviews were conducted to create a relationship of trust and functional emotional contact, contain and manage the family's emotional burden, and provide benefits in terms of emotional expression and catharsis.

The Emotional Distress Thermometer [26-28] was administered for a quick evaluation of emotional distress. This is a single item stress detection tool that uses a Likert scale from 0 (no perception of stress) to 10 (extreme distress). Patients assess their emotional distress over the past week. The tool identifies a threshold value of 4 which represents an important and significant level of stress perceived by the patient [29-31]. The tool proved beneficial for the setting and the particular type of users described in our work.

Furthermore, the Emotional Distress Thermometer includes a list of 39 factors that represent the significant sources of stress perceived by the patient.

Results

Between October 2020 and February 2021, the ISMETT Psychology Service contacted 60 family members of COVID-19 ICU patients. Patients admitted during this timeframe had an average age of 54 years (10 females and 50 males). At the time of writing the article, 21 deaths and 15 transfers to post-COVID-19 rehabilitation facilities were reported in the initial group. Out of all the contacted family members, 23 were followed by periodic telephone interviews for psychological coun-

seling. The 23 relatives that received counseling were 15 spouses (13 wives and 2 husbands), 5 sons, 1 brother and 1 daughter-in-law. Overall, 86 psychological interviews were conducted. Of the family members who received counseling, 9 had to deal with the death of their loved one in the ICU and 14 experienced a gradual improvement of the patient until discharge from hospital or transfer to another non-intensive care unit. The mean level of emotional distress detected with the stress thermometer was severe stress (7 ± 1.6). The area most affected was emotional problems: 21 family members indicated emotional problems as the cause of the discomfort and specifically all of them checked the "Fear" box, three also checked "Nervousness", and two "Depression". The relational problem was indicated as the main cause of discomfort for two family members both describing relationship problems with children.
Follow-up data at six months after hospital discharge are not yet available.

Discussion

This study attempted to describe the emotional context of a group of family members facing the painful therapeutic path of their loved ones, hospitalized in an intensive care unit due to the SARS-CoV-2 infection. The 60 family members contacted by telephone reported a strong emotional distress experienced due to apprehension about the clinical conditions of their loved one and their difficulty tolerating the physical and emotional distance from the patient. A number of family members (23) agreed to receive the telephone psychological counseling service. The initial counseling interviews revealed the strong emotional burden experienced by the family members. The feeling of physical and emotional distance encouraged feelings of strong helplessness inducing negative thoughts of a catastrophic type. Some of the comments most commonly voiced during the first interviews were: *"Every time the phone rings, I imagine the doctor's voice telling me my husband is dead", "Every night I suddenly wake up after dreaming my husband is dead and that I'm not there [with him]".* Others described the difficulty coping with the absence, although temporary, of a family member, *"My husband has always been the one taking care of family matters, and now I'll have to manage my work, bills and children on my own".*
This condition was confirmed by data that emerged after administering the stress thermometer, the perceived stress level was described as severe (M7 DS) and 21 families identified emotional problems as the only strong source of distress.
Some families had to face a real bereavement, due to the worsening of the clinical conditions of the COVID-19 patient, and death in the ICU (9 patients). The death of a family member in an intensive care unit increases the risk of developing post-bereavement depression, causing the family member to imagine an indecorous end of life for their loved one, and this leads to worsening the bereavement processing [32-36].
The other family members (14) received counseling during the difficult path of care of the COVID-19 patient, daily waiting for news and fearing for a sudden worsening of the patient's conditions until discharge from the ICU.
The availability and motivation of family members to rely on telephone counseling confirmed their need to have their emotional needs recognized and receive psychological tools to help them adapt to the complex and critical clinical conditions of their loved ones, and to be encouraged with respect to their resilience [36]. The attention paid to a group of family members of very critically ill patients at IRCCS ISMETT also showed how patient and family centered care can be maintained despite the pandemic and rigid isolation and social distancing measures [37]. Furthermore, the new model of family counseling using other communication media such as the telephone can represent an innovation that can also be implemented in other post-pandemic contexts.
Our experience of psychological support to family members of COVID-19 patients aims to help encourage new models of patient and family-centered models of care for critical patients [38].
Follow-up data at six months after hospital discharge are not yet available.

Limitations of the study

The reduced reference sample makes it difficult to generalize the data described in our study. Furthermore, follow-up data at 6 months from discharge from the COVID-19 ICU has not yet been collected and processed. This data could provide interesting results in terms of long-term psychological reaction of the patients' families.

Conclusions

The traumatic experience suffered by relatives of COVID-19 ICU patients is another aspect of the dramatic nature of the pandemic. This goal of this study is to represent and describe a further element of the complex clinical history of the SARS-CoV-2 pandemic, focusing on and recognizing the emotional distress experienced by family members of COVID-19 patients. In addition to the psychological and psychiatric outcomes of COVID-19 patients subject to a prolonged ICU stay, future research will be required to study the post-traumatic sequelae experienced by family members during the hospitalization of their loved one [39] and

to develop management plans for their emotional burden.

Finally, our work aims at offering an example of patient- and family-centered care attempted despite the constraints imposed by the isolation and distancing measures imposed by the SARS-CoV-2 pandemic, especially within a hospital setting.

Ethical consideration

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Conflict of interest

The Authors declare no conflict of interest.

Author contributions

The Authors have contribuited equally to the work.

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Original article

The effect of indigenous games on depression in children

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SUMMARY

This study examines the effect of indigenous games on children's depression. A quasi-experimental method was used with a pretest-posttest design and a control group. The sample was 60 people selected by the Convenience sampling method. The sample was randomly divided into experimental and control groups (30 people in each group). The experimental group practiced indigenous games in eight weeks with three 45 minutes sessions per week. The control group engaged only in daily activities. The Maria Kovacs inventory measures depression in children. Data were analyzed using the analysis of covariance. The results showed that indigenous games influenced children's depression and its subscales.

Key words: depression, indigenous games, motor development, children

Introduction

Depression is a mental illness affecting children and makes them feel sad, angry, and failure for an extended period. Diseases and disorders affect growth [1-4]. In the past, experts did not believe that children could suffer from depression, but now scientists believe that acute depression is widespread among children. According to the National Alliance on Mental Illness, About 2 percent of children aged 6 to 12 and 4 percent of adolescents have major depression. The prevalence of major depressive disorder in adolescent girls and adult women is twice as high as adolescent boys and adult men [5]. Children can be a reliable reporter of their behavior, emotions, relationships, and problems related to their psychosocial functions. Nevertheless, they may express their boredom and nostalgia by different titles, so it is necessary to ask questions about sadness, emptiness, boredom and unhappiness, the desire to cry, and the feeling of permanent inner unhappiness [6]. Games are the interventions used to improve various growth aspects [7-9]. Traditionally, Indigenous games in the Vast and ancient land of Iran, despite the diversity of climate and cultural roots, have been common, and no one knows when, where or by whom started. These games have human and moral value and a tool for transmitting ideas, culture, and civilization from one generation to another. In recent years, they have been decreased due to the industrialization and growth and development of video games [10]. Indigenous games are significant for children, and many parents think that games are designed solely for entertainment. The identity and experiences and physical health and fitness are acquired in these games [11]. Sports activities and games are a social phenomenon that causes vitality and Physical fitness, improves the quality of children's perceived readiness, eliminates their isolation, and provides grounds for developing social and cultural character and excellence of behaviors and values [12]. Therefore, this study examines the effect of indigenous games on depression in children.

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Methodology

The research method was quasi-experimental with a pretest-posttest design and a control group. First, 60 people were selected by the Convenience sampling method and then randomly divided into experimental and control groups (30 people in each group). After identifying the participants, the implementation method and participation benefits were explained and written consent was obtained from the parents. Ethical considerations reassured participants that they could be excluded from the study at any time and that all information would be kept confidential. Then, according to the discussions, a specific time was set for conducting the tests and completing the questionnaires. According to the data collection process, first, both groups were tested for depression. Participants were then randomly divided into two groups: random and control. The experimental group practiced indigenous games in eight weeks with three 45 minutes sessions per week. The control group engaged only in daily activities. After the training sessions, post-test research variables were performed. A children's depression questionnaire was used to measure the research variables.

Child and Adolescent Depression Scale: In this study, Children's Depression Inventory (CDI) written by Maria Kovacs was used to measure participants' depression. This questionnaire contains 27 questions. Originated from Beck's Depression Inventory, The items of this questionnaire measure these components: negative mood, interpersonal problems, Ineffectiveness, Anhedonia, and Negative self-esteem. Analysis of covariance was used to analyze the data. A significance level of $p < 0.05$ was considered in all analyzes.

Results

Table I presents the mean and standard deviation of the research variables.

Kolmogorov-Smirnov test showed that the distribution of data was normal ($p > 0.05$). After controlling the pre-test levels, the results showed There was a significant difference between the post-tests of the experimental and control groups in terms of negative mood ($0.272 = \eta^2$,$001.0 < p$,$21.306 = {}_{1,57}F$), Ineffectiveness ($11.0 = \eta^2$,$0.05 < p$,$18.47 = {}_{1,57}F$), interpersonal problems ($0.10 = \eta^2$,$0.05 < p$,$17.47 = {}_{1,57}F$), Anhedonia ($0.21 = \eta^2$,$0.05 < p$,$15.22 = {}_{1,57}F$), negative self-esteem ($0.12 = \eta^2$,$0.05 < p$,$13.22 = {}_{1,57}F$) and total ($0.406 = \eta^2$,$0.001 < p$,$38.913 = {}_{1,57}F$). According to η^2, 406% of the changes in depression were due to indigenous games (Tab. II).

TABLE I. *Descriptive statistics of research variables.*

Variable	Mean	Standard deviation
Negative mood	2.4	25.0
Ineffectiveness	25.3	15.0
Interpersonal problems	05.2	13.0
Anhedonia	2.4	11.0
Negative self-esteem	1.4	21.0
Depression total number	55.16	35.2

TABLE II. *Descriptive statistics of research variables and summary of covariance analysis results.*

Variable negative mood	Analysis of covariance summery		
	F	*P*	η^2
Ineffectiveness	21.306	***0.000	272.0
interpersonal problems	47.18	*02.0	11.0
Anhedonia	47.17	*03.0	1.0
Negative self-esteem	04.15	*01.0	21.0
Depression total number	22.13	*001.0	12.0
Variable	38.913	***0.000	0.406

Discussion

The study examined the effect of indigenous games on depression in children. The results showed that indigenous games influenced children's depression and its subscales. Depression in children and adolescents is an important psychiatric disorder with a significant impact on their psychosocial functions and is associated with a risk of death due to suicide. Depression is a mental illness that sometimes affects children and causes them to feel sad, angry, and frustrated for a long period. traditionally, experts did not believe that children could suffer from depression, but now scientists believe that major depression is widespread in children. according to the National Alliance on Mental Illness, About 2 percent of children aged 6 to 12 and 4 percent of adolescents have major depression; over the past two decades, children's depression has received increasing attention. It is estimated that 2.5 to 4 percent of children are clinically depressed, and it is important to note that the average depression in children and adolescents is 7 to 9 months, as a child may be depressed throughout the school year, and the disorder does not improve and interferes with learning. In general, the emotional symptoms of depression in children manifested as sadness, withdrawal or social isolation, physical complaints, anorexia or obesity, urinary incontinence, reluctance to go to school, and decreased school achievements [13].

Although depression in childhood and adolescence has only recently been considered and depression in children has not been well defined, it is estimated that 60% of children in special education programs may experience depression along with other disorders. girls are more prone to depression than boys. Depression is accompanied by negative self-esteem, low social and problem-solving skills, inability to regulate personal behavior to deal with stress, negative thoughts, and learned helplessness [14]. Fundamental motor skills are refined and combined to form specific motor skills and other motor skills. By the age of 6, they are potentially in the developmental stage of fundamental motor skills and are ready to transition to specific motor skills. Achieving the advanced stage of most fundamental motor skills depends on the adequate development of neural structure, anatomical and physiological features, and perceptual-motor abilities. However, many adolescents are developmentally disabled in terms of motor skills. This is because they have limited opportunities for regular practice, have little or no training, and have received little or no encouragement. According to the results, it can be said that during the game, the mental and physical forces of the child; that is, accuracy, memory, imagination, order, agility, skill, physical strength, etc. develop and the game is a stimulus and motivation for the child to gain social experiences. The child normally expresses "himself" through participation. the child gets an opportunity to express feelings and problems, and in other words, himself. The child Learns to help and seek help. Play is important for the healthy development of the brain and allows children to use their creative power to develop physical, cognitive, and emotional skills. Children interact and explore the world around them through play games. They also learn to overcome their fears by interacting with other peers and caregivers or playing different roles. Molanoroozi et al. [15] concluded that indigenous games had improved the physical fitness of non-athlete students. Figen Boom [16] showed that resistance training and games increase strength, endurance and muscle strength, bone mineral density, Cardiorespiratory fitness, reduce injuries and improve cholesterol, motor skills, and body composition. Different games should not be taken into account separately. Children can play many games at the same time, which indicates the extraordinary power of the game. The game is an opportunity for children to practice, learn and grow different skills with experiences that seem even rudimentary and simple. Parents can help their child reach their full potential through play. By observing and joining child-centered games, parents find a unique opportunity to see the world through their child's eyes, and their child takes the lead in the world created and tailored to their needs. The interaction created between children and parents conveys the message to children that parents pay full attention, and this constructive interaction leads to the establishment of lasting relationships between children and parents. In child-centered games, they practice decision-making skills and discovering their interests and talents. In contrast to passive entertainment, playing has a great impact on children's health and physical development. Unstructured play is an excellent way to Increasing the level of physical activity in children and an important strategy in combating obesity. Above all, play is a simple joy that forms a valuable part of childhood. While children participate in running, spinning, climbing, and jumping, they are strengthening their physical strength and coordination. Physical games also allow releasing the undeniable energy of childhood. Physical activity can also help develop a physical sense of self, motor boundaries, and impulse control. As children learn to control their bodies, the brain begins to relate these movements at the motor and cognitive levels. Today, institutions such as the Ministry of Education, Sports, and Youth and the General Directorate of Physical Education play a decisive role in children's physical, mental, and psychological education. The research findings have provided useful information for principals and officials of education and schools in Iran. They will also help them get acquainted with the impact of indigenous games on children's depression to make decisions based on children's mental and physical development and be informed of the priorities of the indigenous game.

Ethical consideration

This research has been conducted in compliance with ethical standards and participants' satisfaction.

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Conflict of interest

There is no conflict of interest for the authors of this article.

Author contributions

Both authors had a common share.

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Original article

Effectiveness of Qigong exercises and resilience training on the perceived stress of male students due to COVID-19

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SUMMARY

Background

According to experts, stress cuase a weak immune system and make people vulnerable to corona virus. Accordingly, the aim of this study was to compare the effectiveness of Qigong exercises and resilience training on the perceived stress of male students due to COVID-19.

Methods

A semi-experimental design was conducted (pre-test and post-test) with two experimental and one control groups. 45 male students of Tabriz university who had higher scores on the Cohen Perceived Stress Scale (PSS-14) were selected by convenience sampling and randomly divided into two experimental groups (15 participants in each group) and one control group (15 participants). For the first group, resilience training (10 sessions; a week 2 sessions, one and a half hours) and for the second group, Qigong exercises (10 sessions; a week 2 sessions, 30 minutes) was applied and the control group did not receive any training. Prior and after the training, the subjects completed Cohen et al. (1983) Perceived Stress Scale (PSS-14). Univariate analysis of covariance (ANCOVA) was used to analyze the data.

Results

The results showed that the mean scores of Perceived Stress due to COVID-19 reduced significantly in the resilience training group comparison to Qigong exercises group and in the Qigong exercises group comparison to the control group in the post-test ($p < 0.05$).

Conclusions

The results showed that resilience training is more effective in reducing perceived stress among male students due to Covid-19 disease than Qigong exercises.

Key words: resilience, Qigong, perceived stress, COVID-19, male students

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Introduction

COVID-19 disease, caused by SARS-CoV-2, was first diagnosed in December 2019 in Wuhan, China [1]. The outbreak spread from Wuhan city to 30 provinces in China and then to other countries. As now, cases of this disease have been reported in all countries of the world [2]. Symptoms of COVID-19 in patients including fever (98%), cough (76%), fatigue and muscle aches (44%) and shortness of breath (55%)[3] in a small number of patients diarrhea (3%), vomiting (5%), sputum (28%) and bleeding (5%) have been reported [4].

The existence of patients with coronavirus in Iran was officially confirmed on February 20, 2020 [5]. Public health efforts to curb the rapid transmission of COVID-19 have led to infection control measures and changes in related procedures and policies. Governments have implemented a wide range of containment measures, including early detection and quarantine

of suspected and confirmed cases, establishment of shelter hospitals, travel restrictions, issuance of diagnostic kits and extensive quarantines, and a social and physical distancing plan [6].

But the implementation of health policies, despite the positive consequences, has led to negative psychological effects in society. Fear of illness, fear of death, spreading false news and rumors, interfering with daily activities, travel prohibitions or restrictions, reducing social relationships (co-workers, friends and family), job and financial problems, and dozens of other consequences These conditions threaten the mental health of participants in society [7]. In fact, the unknownness of the disease and the creation of cognitive ambiguity in individuals, lack of definitive treatment, high prevalence and high mortality have caused severe psychological maladaptation such as stress, anxiety and depression [8].

Perceived stress is the body's response to a change that requires adaptation or a physical or mental response. Stress can be caused by any stressful factor or stimulus, even dealing with a patient [9]. Fear and stress by stimulating the hypothalamus in the brain and subsequently increasing the secretion of cortisol from the adrenal cortex and stimulating the sympathetic nerves throughout the body in the short term is beneficial for the body to deal with stressors [10]. However, if this fear and stress and the body's response to increase cortisol levels and sympathetic stimulation persists in the long run, it is destructive and leads to a weakened immune system and reduced ability of the body to fight diseases such as coronary artery disease [11].

University students are another group of person prone to developing psychological symptoms during the outbreak of COVID-19 disease. At the beginning of the outbreak of this disease in our dear country Iran, like other countries in the world, the closure of universities was one of the first and most basic measures to prevent the widespread spread of COVID-19 disease [12]. Son et al. [13] in an interview survey to examine the effects of COVID-19 on the mental health of university students on 195 students at a large public university in the United States and found that out of 195 students, 138 (71%) showed increased stress and anxiety due to the prevalence of COVID-19.

Numerous stressors were found to help increase students 'levels of stress, anxiety, and depressive thoughts, including fear and anxiety about their own and their loved ones' health (91% reported negative effects of the epidemic), difficulty concentrating (89%), Disorders in sleep pattern (86%), decreased interactions due to the plan of physical and social distance (86%) and increased concerns about academic performance (82%). To cope with stress and anxiety, participants sought support from others and helped themselves by adopting negative or positive coping mechanisms.

Today, students have an important role in governing the future of the country. The importance of this role is that students are not only the main part of specialists in various fields of each country, but also this group are the main managers in the future administration of the country and the leader of other sections of society in leading to the perfection and goals of the country. A society that thinks about its own health and that of its future generations should take steps to achieve its ideals more than before by examining and eliminating the causes of stress and causing mental health problems or maintaining the health of its future creators [14]. Researchers believe that resilience training [15] and Qigong exercises [16] are among the interventions that can play a significant role in reducing stress.

Resilience as a process is the ability to successfully adapt to threatening conditions and in other words, positive adaptation in response to adverse conditions [17]. Of course, resilience is not just passive resistance to harm or threatening situations, but the resilient person is an active participant and builder of his or her environment. Resilient participants with the ability to return and recover, have optimism and intellectual flexibility, skilled in transforming problems as an opportunity to learn and grow, have perseverance, self-esteem, have a healthy support network, able to develop emotional and supernatural abilities, have voice independence, They have a sense of humor and have the ability to solve problems and resolve conflicts [18].

While participants with low resilience are vulnerable and lack the courage, motivation and strategies to change stressful situations, they exaggerate their problems and consider themselves victims of accidents [19]. Accordingly, resilience is a trait that varies from person to person and can increase or decrease over time [20].

Although resilience is to some extent a personal trait and to some extent the result of one's environmental experiences, humans are not victims of their environment or inheritance; individuals can be trained to increase their resilience capacity by learning certain skills. Individuals' reactions to stress can be altered by unpleasant events and difficulties, so that they can overcome negative environmental problems [21]. Resilience skills training refer to a cognitive-behavioral process that provides a variety of alternative and potential responses to problematic situations and increases the possibility of selecting the best and most effective alternative responses [22].

Rose et al. [23] showed that the subjects had significantly less stress and more perception of stress after the implementation of the program "Resilience and stress management".

In recent years, participants have increasingly used mind and body exercises (such as Qigong, Tai chi and

Yoga) as complementary and alternative therapies to control stress [24]. The 2012 US National Health Interview (NHIS) data show that more than 7 million adults in the United States practice taichi and Qigong (TQ), and its popularity is growing worldwide [25]. Qigong is an ancient martial art developed in China that has been used in China for thousands of years to improve fitness and endurance. The basic components of Qigong practice include concentration, relaxation, meditation, breathing regulation, posture, and movement [26].

According to the philosophy of traditional Chinese medicine, Qigong practice is the concentration of the senses and gentle movements to achieve a coordinated flow of vital energy (qi) and to regulate the body's functional activities through regulated breathing. By exercising regularly and practicing structural movements, as well as focusing on the mind and breath, practitioners can experience mood stabilization and improved strength and fitness. Qigong is a body-fitting exercise that is easily flexible and can be practiced anywhere, anytime, without any special equipment. This method is widely used not only to improve physical health, but also to control stress and improve psychological well-being [27].

According to the theories of amines and endorphins, an increase in parasympathetic levels and a decrease in sympathetic activity are associated with a decrease in blood pressure and levels of stress hormones (eg, noradrenaline, cortisol, etc.), which leads to a decrease in anxiety and stress after short-term Qigong training [28]. The results of a study by Feng et al. (2008) show that, like other mind and body exercises in traditional Chinese medicine, Qigong regulates the rhythm and pattern of breathing, movement and posture, and meditation. Due to these characteristics, Qigong has a remarkable ability to prevent, treat and rehabilitate respiratory infections such as COVID-19. Potential mechanisms of action include reducing stress, regulating emotions, strengthening respiratory muscles, reducing inflammation, and strengthening immune function [29].

The results of systematic study and meta-analysis of Wang et al. [8] showed that Qigong had a positive effect on psychological well-being and reduced depression and anxiety.

Considering that the student community of our country constitutes a significant part of the population and is increasing every year, the importance of students' health (physical and mental) is becoming much clear. Due to the research gap and the lack of empirical research in the field of educational interventions affecting the perceived stress caused by coronavirus in students and the lack of any therapeutic comparisons in this field, this study aims to compare the effect of resilience training and Qigong exercises on perceived stress.

Materials and methods

The method of the present study was quasi-experimental (pre-test-post-test) using two experimental groups and one control group. The statistical population of the present study is all male students of University of Tabriz in the academic year 2020-2021 in the number of 13.000. The sample of the study, 45 male students was selected using available sampling method and randomly in two groups. Qigong resilience training and exercises (15 participants in each group) and a control group (15 participants) are placed.

The criteria for entering the group were: 1: age range 25 to 40 years; 2: has higher scores on the Cohen Perceived Stress Scale (PSS-14) [33]; 3: absence of physical disability; 4: do not use psychiatric drugs; 5: conscious and voluntary satisfaction of participating in meetings and criteria for exclusion from the present study: 1: not attending meetings for more than one session; 2: the occurrence of a specific problem during the study was considered. It should be noted that every 45 male students who meet the inclusion criteria according to their place of residence to health centers in Tabriz who have a file and based on the diagnosis of internal medicine (blood test) of coronary heart disease and its symptoms, including disorders respiratory, runny nose, dry cough, dizziness, sore throat and body aches, no fever. After receiving the license from the University of Tabriz, coordination with the authorities and obtaining informed consent from the male students, it was decided that the selected students (it should be noted that first the perceived stress scale of Cohen et al. [33] was designed online on the University website. All male students of University were provided with a questionnaire and some of them (about 800 participants, students who met the inclusion criteria; were invited to the university by phone) at the appointed time in the amphitheater, the theater of the University of Tabriz which had the necessary facilities including proper ventilation, computer, video projector, etc., to attend.

After the presence of 45 male students (performing a thermometer at the entrance of the university to check participants's body temperature was used as a screenser and the use of health alcohol to disinfect hands and provide a mask to each subject and observe social distance as a health protocol in this study. The researcher communicated with the participants, answered the students' questions, and explained how to complete the questionnaires.

After conducting the pre-test (Cohen et al. Perceived Stress Scale, 1983) [33], an agreement was reached on the date of the next sessions and 45 male students who met the inclusion criteria were randomly divided into 2 experimental groups of 15 (group 1: resilience training and group 2: Qigong exercises) and 15 control group were divided. After selecting the test groups, in the introduc-

tory session of the experimental groups, they were given a summary of the goals and methods of resilience training and Qigong exercises, and theywere asked not to talk about the content of the sessions with other students and also asked confident students. They were not under any other educational or medical program.
Experimental group 1 students received resilience training (10 sessions; two sessions in a week in one hour) and experimental group 2 students received Qigong training exercises (10 sessions of 30 to 40 minutes per week) and the control group did not receive any training at al. In resilience training sessions, training materials were presented in power point format along with pictures and Qigong exercises were performed outdoors in a football field (on a soft mat for each subject) in accordance with the health protocol.
After the training sessions, post-test (Cohen et al. Perceived Stress Scale, 1983) [33] was measured in all three groups (2 experimental groups and one control group).

The following tools have been used to collect information

Cohen Perceived Stress Scale (PSS-14)

The Perceived Stress Questionnaire was first developed by Cohen et al. [33]. This tool is very suitable for determining the extent to which participants recognize their stress in the face of unpredictable and uncontrollable events in life and contains 14 questions and the answers are arranged in a scale of five Likert options. For each option, a score of 0 to 4 is awarded (0 = never, 1 = rarely, 2 = sometimes, 3 = most of the time, and 4 = all the time). For 8 tool questions, the scores are calculated inversely. The range of scores that can be achieved is between 0.56 and higher scores indicate more perceived stress. The overall score of perceived stress is divided into three levels (0-14, 15-28, 58-29). Cronbach's alpha coefficients ranged from 0.84 to 0.86 in students [33]. In Iran, in the study of Shamsi et al. [34], Cronbach's alpha level was reported to be 0.88. Also, the validity of this questionnaire has been confirmed by factor, structural and content analysis methods [34].

Intervention methods

Resilience training

For the first group, resilience training was taught in 9 sessions and each session for one and a half hours in groups. This treatment method has been developed by Jahed Motlagh et al. (2015) and its effectiveness on anxiety and stress has been confirmed [24].

Qigong exercises

The total duration of the exercises was 10 sessions, two sessions per week and each session lasted 30 to 40 minutes. Traditional Chinese Qigong is all about the coordination of body, breath and mind through a series of movements and has been shown to have mental benefits (reducing anxiety and stress) and physical health [lowering blood pressure, better sleep, increasing endurance, improving kidney function]. Is the relief of low back pain) [25]. These Qigong exercises are part of the Qigong movements that affect mental happiness, health, and stress reduction, adapted from Yang's book Health and Martial Arts, and can be seen in Figure 1 (left to right, respectively).

Data analysis

Data were analyzed using SPSS-21 statistical software. Univariate analysis of covariance test with assumptions of normal distribution of scores through Shapiro-Wilk test, assumption of homogeneity of regression slope using group interaction* Pre-test and Levin test for homogeneity of variable variance error in groups were used.

Results

According to the Table I, it is concluded that resilience training have a significant positive effect on reducing the perceived stress of students due to corona.
According to the Table II, it is concluded that Qigong exercises have a significant positive effect on reducing the perceived stress level of students due to corona.
According to the Table III, it is concluded that the effect of resilience training on reducing the perceived stress of students due to corona is significantly greater than the effect of Qigong exercises.

Discussion

The aim of this study was to compare the effect of resilience training and Qigong exercises on the perceived stresscaused by COVID-19. Compared to the Qigong training group and in the Qigong training group compared to the control group, it decreased significantly in the post-test. There is no report in the research literature on comparing the effectiveness of these trainings on reducing perceived stress due to COVID-19 in male

FIGURE 1. *Qigong movements performed in the training protocol.*

TABLE I. *Results of differences between perceived stress in post-test of control and resilience training groups.*

Source of change	Sum of squares	df	Average squares	F	P	Eta
The effect of pre-test	452.02	1	452.02	1580.1	0.001	0.976
Group effect	415.12	1	415.12	1412.4	0.001	0.768
Error	7.424	27	0.285			
Total	5641	30				

TABLE II. *Results of differences of perceived stress in the post-test between control and Qigong exercises groups.*

Source of change	Sum of squares	df	Average squares	F	P	Eta
The effect of pre-test	552.02	1	552.02	1465.1	0.001	0.980
Group effect	115.12	1	115.12	356.4	0.001	0.754
Error	9.424	27	0.345			
Total	5232	30				

TABLE III. *Results of differences of perceived stress in the post-test between resilience training and Qigong exercises groups.*

Source of change	Sum of squares	df	Average squares	F	P	Eta
The effect of pre-test	467.15	1	467.15	2365.1	0.001	0.978
Group effect	79.12	1	79.12	446.4	0.001	0.654
Error	5.32	27	0.176			
Total	6246	30				

students; But the results are consistent with the results of studies by Steensma et al. [23], and Rose et al. [25] that group resilience training has led to the use of effective coping strategies and also plays an important role in reducing stress, increasing adaptation and control perception. Students have been stressed.

Also with the results of studies by Wang et al. [8] and Feng et al. [31] that Qigong exercises have a significant ability to prevent, treat and rehabilitate respiratory infections such as COVID-19 as well as has a positive effect on physical-mental well-being and reduces adult stress, anxiety and depression.

Explaining this research finding, it can be stated that the release of COVID-19 due to its rapid transmission, which is a feature of this virus, has caused a state of emergency in global health in less than a few months around the world. This contagious disease not only raises concerns about public physical health but also causes a number of psychological illnesses. In these circumstances, maintaining the mental health of individuals is essential, as participants in different parts of society may experience stressful stimuli during the release of COVID-19 [12]. The physiological effects of stress are beneficial when there is a response to prepare the body for "war and escape," but they can be harmful if prolonged.

In short, the experience of stress for a long time can weaken the human immune system and make a person vulnerable to diseases, from small samples such as colds to more serious cases such as COVID-19 [40].

But the important thing about stress is how you respond to it, which can play a big role in a person's adjustment. Resilience is defined as a person's confidence in his or her ability to cope with stress, self-esteem, emotional stability, and personal characteristics that increase social support from others. Participants who are resilient often develop positive emotions. After dealing with stressors, they return to normal. Resilient participants go through stressful events without losing their mental health and suffering from mental illness. In some cases, they also seem to have progressed and succeeded despite their difficult experiences [45].

Therefore, resilience training in this study causes students to be optimistic, assertive and confident in the face of stressful events such as COVID-19 disease. Optimistic students are more likely to use problem-solving coping techniques, and when problem-solving coping

techniques are not possible, they use emotion-based adaptive coping techniques such as acceptance, jokes, and positive situational reflection.

It also gives students positive feedback on students' efforts or progress through encouragement, gives them self-awareness, focuses on individual abilities and cognition, and makes students aware of their worth in general, and makes them aware of their inner abilities. Be aware of yourself to deal with problems and also increase responsibility in students by teaching meaning therapy in the final sessions of resilience, relying on the meaning, purpose and values of life as well as interacting with their peers. By accepting responsibility and accepting one's current situation, one is encouraged to work and strive to improve oneself and others in these coronary conditions, and to provide the basis for reducing stress.

On the other hand, one of the most important, simplest and least expensive therapeutic approaches is physical activity and exercise. With the widespread spread of the coronavirus (COVID-19) around the world, this concern has been raised about physical activity and exercise. Healthy and asymptomatic participants can continue moderate-intensity exercise and benefit from the resulting immune function by following health guidelines [46]. Qigong exercise is expected to be a complementary medicine method as a non-pharmacological, low-complication treatment that does not require special equipment; Along with other common therapies to reduce stress in these critical coronary conditions should be used.

The Qigong protocol includes tapping, stretching, massage, twisting and pressing on the spine, internal organs and muscle groups. These actions may increase the body's flexibility and physical health. In fact, evidence has shown that the unique spinal torsion and rotational movements in Chan Mi Gong (one of Qigong's major styles) are related to improved blood circulation [34].

Cognitive-behavioral theory also shows that visual images help athletes regulate emotions, maintain focus under pressure, and increase pain tolerance, which is essential for optimal performance. Accordingly, Qigong causes the person to dismiss aimless thoughts and focus on current visual images (e.g., circulation). In addition, as the theory of distraction has suggested, cognitive activity can temporarily relieve participants of stress and everyday worries. To facilitate relaxation ("relaxation" in "emotion regulation"), qigong practitioners often use positive self-induction (e.g., relax), which was also used in our qigong program. Positive self-induction is likely to support and accelerate the healing process [35].

In fact, the basis of qigong's effect in reducing student stress probably involves several mechanisms. Exercise is known to reduce stress and a specific set of medical qigong is used. This study provides moderate intensity training [43]. Concentration meditation, a component of qigong practice, also reduces stress [44]. The function of the slow and deep breathing pattern similar to that used in this qigong set in lowering blood pressure in participants with mild hypertension and normal blood pressure has been demonstrated through a mechanism related to reduced sympathetic activity [45,46]. Current evidence suggests that TQ training has a physiological effect on immune system function and inflammatory responses [47]. Finally, it has been reported that stress-related endogenous chemicals, including norepinephrine [48] and cortisol [49] are reduced by qigong.

Since previous studies have only examined the psychological consequences of coronavirus among individuals and the existence of a research gap in the field of psychological interventions in the field of mental health in university studentshas not been done. Therefore, in the present study, by examining the effect of Qigong exercises and resilience training, in fact, the physical and psychological dimensions of the effect on perceived stress caused by COVID-19 in students have been combined, which is the strength of this study. One of the limitations of the present study is that it is unisexual with limited participants. So, care should be taken in predicting the results in general.

Conclusions

In general, it can be concluded that resilience training is more effective in reducing perceived stress caused by COVID-19 in male students than Qigong exercises. According to the results of this study and its confirmation through previous research, the use of a combined resilience training program along with Qigong exercises in accordance with the health protocol in person or in remote corona waves and using up-to-date facilities such as video conferencing. And the capacities of social networks and cyberspace are suggested by psychologists and sports educators as effective programs to reduce the perceived stress caused by coronary heart disease, especially students, should be considered by community health officials.

Ethical consideration

This research has been conducted in compliance with ethical standards and participants' satisfaction.

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Conflict of interest

The Authors declare no conflict of interest.

Author contributions

All Authors had a common share.

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Brief article

Subjective experience on group activities of patients admitted in a psychiatric facility during the COVID-19 epidemic: "the Santi's Magazine"

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SUMMARY

Objectives

Italy is one of the most affected countries in the world during the COVID-19 pandemic. The recurring waves of the epidemic largely compromised routine activities of the Italian Departments of Mental Health, significantly reducing outpatient and day service activities. Psychiatric facility and hospital treatments have also been maintained, albeit widely remodeled and conditioned by the fear of contagion. The aim of this paper was to report the subjective experiences on group activities offered in an Italian psychiatric facility for intensive interventions (the Santi Center) during the second wave of the pandemic in the fall of 2020.

Methods

The format of these group activities included weekly face-to-face meetings using supportive, psychoeducational, motor and relaxing techniques, all conducted by mental health professionals. Here we reported the participants' subjective experiences written during the two months of these meetings, all of which merged into the special 2020 Christmas edition of the Santi's magazine. Results

All participants (8 out of 12 inpatients hospitalized in the facility at that time) were affected by psychotic disorders. Patients' experiences on group activities were uniformly positive. In this paper we reported the most significant passages.

Conclusions

Inpatients with psychotic disorder found our group activities very beneficial. Our real-world experience is a useful witness to contrast the general paralysis of mental healthcare interventions, which too much often affected Italian mental healthcare services during the pandemic. Moreover, it advances our understanding of the usefulness of group activities for increasing patient's resilience also in an epidemic era and in a forced social isolation.

Key words: group therapy, psychiatric patients, rehabilitation, psychiatric facility, COVID-19

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Introduction

About 5 million affected cases and 133.000 deaths from the COVID-19 epidemic lead Italy to be considered as one of the most affected countries in Europe and in the world to date [1]. Starting from 21th February 2020 (key date for "Patient zero" identification in Italy), the recurring waves of the pandemic widely compromised routine activities of the Italian Departments of Mental Health, traditionally organized according to a community-based model of care [2]. About this, physical and interpersonal distancing specifi-

cally affected outpatient and day service interventions, concomitantly increasing video conference-based visits and phone calls [3]. However, facility and hospital treatments have also been offered, albeit largely remodeled and conditioned by the fear of contagion [4].
Despite this, here we reported the *subjective experiences* on group activities offered in an Italian psychiatric facility for intensive interventions ("the Santi Center") during the second wave of the epidemic in the fall of 2020 (exactly from 15th October to 30th November 2020), using words and perspectives of the hospitalized patients, overall described in the special 2020 Christmas edition of the "Santi's Magazine".

Methods

The *Santi Center* is a historical residential facility of the Parma Department of Mental Health, in which intervention setting is best for individuals who require intensive treatment and regular monitoring. Intervention plans are comprehensive and individualized, including both individual and group therapy [5].
The format of our *group activities* included weekly face-to-face meetings using supportive, psychoeducational, motor and relaxing techniques, all conducted by mental healthcare professionals (i.e. educators, nurses, psychologists and psychiatrists). Each session (lasted approximately 60 minutes) was focused on specific topic related to the group's needs, such as improving knowledge about mental illness and coping with symptoms and negative affect, increasing understanding about psychotropic medication and their side effects, improving interpersonal skills and the management of negative emotions (e.g. anger, anxiety and sadness, including fear of contagion and social isolation), better countering social and internal stigma, promoting physical activity and learning simple techniques to relax. These meetings had the beneficial effect of bringing together people with similar experiential conditions, similar worries, feelings and everyday problems (including social distancing due to the COVID-19 epidemic) under the guidance of a mental healthcare professional. All participants and group leaders had previously completed the anti COVID-19 vaccination course and must have had a negative result of nasopharyngeal molecular swab immediately prior to the current hospitalization. Group sessions were held in a meeting room of large size such as to allow a right distance of the participants (at least two meters from each other), in any case all wearing a FFP2 mask.
In this respect, all *group participants* (8 out of 12 inpatients hospitalized in the Santi center at that time) were diagnosed by relatively stabilized psychotic disorders (3 with schizophrenia, 3 with schizoaffective disorder and 2 with bipolar I disorder with psychotic symptoms) in accordance with the Diagnostic and Statistical Manual of mental disorders, IV Edition, Text Revised (DSM-IV-TR) [6]. The major psychiatric diagnoses were made using the Structured Clinical Interview for DSM-IV-TR axis I disorders (SCID-I) [7]. All group members gave their written informed consent to anonymously publish their personal perspectives on the Santi Center group activities included in special 2020 Christmas Edition of the "Santi Magazine". Local relevant ethical approval was obtained (AVEN Ethics Committee protocol n. 36102/2019). The current paper has also been written in accordance with the principles of the 1983 Declaration of Helsinki and its later amendments.

Results

Patients' perspectives

Participants' perspectives on group activities offered at the Santi Center during the second wave of the COVID-19 pandemic in the fall 2020 were uniformly positive. By reading their written impression published in the special Christmas Edition of the Santi's Magazine, the biggest benefits of participating in our group meetings were: to feel less lonely and isolated; to decrease anxiety, distress, depression and fear of contagion; to openly talk about their feelings and worries; to discover their strengths and abilities; to better understand mental illness and its treatment; to improve their skills in coping with symptoms and frustrating social situations; to gain a sense of hope, resilience, control and empowerment, especially in a historical time period dominated by the COVID-19 pandemic.

The Santi's Magazine – 2020 Christmas Edition

D. - Prologue
"Despite the pandemic, as patients of the Santi Center we're used to tell our daily stories, our feelings and personal experiences, even from the past. At the end of this difficult year characterized by the COVID-19 epidemic, we want to get away from our closed and restricted group dimension and to be more open towards the community which surrounds us. To do so, we use a simple communication tool: i.e. a magazine that includes our personal life stories that we learned to accept and we wanted to share. "The Santi's Magazine" comes from a playing dimension, but it seriously talks about our journey, our thoughts and feelings, despite the pandemic. It's a present for all of you: merry Christmas from the Santi inpatients".

S. – My story at the Santi Center
"The Santi Center is not only a facility using care programs focused on the psychiatric illness. It treats inpatients following an intervention approach that is focused

on their health, psychological and social needs. The center offers specific care pathway for each individual in order to support her/him not only from a medical point of view (i.e. with a pharmacological therapy), but also from a social and interpersonal point of view, engaging her/him in specific psychological, educational and social group activities. Each patient has her/his personalized journey, which also may include social integration within specific interpersonal meetings valorizing individual potentials. Indeed, even during the second wave of the COVID-19 pandemic, the Santi center has continued to provide many activities: a psycho-educational group led by two volunteer psychologists, a "shiatsu" group, a yoga relaxing group and a "Nordic walking" activity that needs sticks and a hiking guide. The Santi center is a complete facility that doesn't leave you on your own, but it walks you through your journey so that you may discover your deep down qualities".

G. - My experience of life at the Santi Center
"I arrived at the Santi Center about 2 months ago, during the COVID-19 epidemic. I felt lost for the first few days because it was not like the place I was used to. Moreover, I was afraid of getting infected. It was my first time entering a residential community like this, but after a short time I got used to it and I met nice and altruistic people. Group participants reassured me on how to avoid the contagion, on how to use protection measures correctly. Over time, I got started feeling good within group meetings. I heard experiences and points of view of other inpatients which were very different from mine, and even if it made me upset at the beginning, subsequently it turned to be a positive thing that will help me in the future".

M. - The inevitability of things
"It looks like yesterday when I first entered at the Santi Center with all my fears and doubts. I was also afraid of getting infected. However, it has been 2 months since I first entered. I had to deal with what surrounded me, with the medical staff and all the other inpatients. The relationships we created are unbelievable. Together with all these individuals, I managed to discover the path I was destined to take. A path that has tested me many times, but that the shiatzu, the Nordic walking and all the other group activities helped me to take and gave me the strength to fight against both my terrible mental disease and fear of contagion".

A. - Nordic walking
"I'm here writing because on October-November 2020 I was been hospitalized at the Santi Center due to a relapse of my mental disorder. I feel like I'm the same as every person that suffers, but also that tries to find her/his new identity, her/his personal freedom and – why not – her/his happiness. This year, due to the pandemic and its restrictions, the Santi Center provided new interesting activities. The psychoeducational group led by volunteer psychologists had been very useful. It helped me to protect me from the COVID-19 contagion, to engage myself, to open up and also to get closer with other inpatients (even if it was for a short time). Together with the shiatsu massages (that I really appreciated and helped me getting relaxed), I enjoyed a lot the Nordic walking activity. At the beginning I was afraid and not sure, but when I decided to participate I got very passionate about it. I still enjoy walking around. These group activities were a cure-all and their utility has been unequivocal. It was nice being here".

C. – Psychoeducational journey
"The psychoeducational group consisted in 5 meetings provided every Monday at 5.30 in the afternoon at the conference room of the Santi Center. These meetings were offered at that particular time because it was after the nap so that everyone could participate. The first meeting was about psychosis. It was full of stories and personal experiences which made this journey not only a moment of information, but also a place of fun and freedom. A psychiatrist led a very interesting lesson about pharmacology and side effects of antipsychotic medications. Although we shared moments of fun and relax, we also became aware of the relevance of these topics (such as psychosis, which always gives anxiety to the patient)".

B. – My experience
"I want to talk about my personal experience at the Santi Center in Parma where I was hospitalized in October 2020. During my 2 months of hospitalization within the second wave of the COVID-19 pandemic, I attended the psychoeducational group of inpatients conducted by a volunteer psychologist. In these meetings, we actively participated speaking up or listening to other people. In the group activities, there were things such as saying your opinion regarding something (such as the fear of contagion, the correct use of protective measures to counter the COVID-19 diffusion, increasing personal skills to improve social abilities), but also making up some scenes that were used as metaphors for real life situations and events. We acted like we were on the phone with another person just to increase our skill communication. I liked this group so much that I still will go to the meetings even if I'm no longer hospitalized. Moreover, it didn't get me bored because it lasted for less than 1 hour".

Discussion

Individuals affected by severe mental illness generally consider group activities very beneficial [8,9]. With these group experiences, the Santi Center inpatients leaned the crucial importance of sharing their feelings, their worries and their daily stories (also about the COVID-19 pandemic and the fear of contagion). At the end of these group meetings, patients wanted to get away from their restricted dimension, from their social isolation (also due to the COVID-19 pandemic), to go beyond the closed borders of the psychiatric hospital (once again locked down after the 1978 Italian reform law) [10] and to become more open towards the community surrounding them. So, they wanted to use an easy communication tool (i.e. the special 2020 Christmas edition of the Santi Magazine) in which including their personal journey, their worries, their feelings and thoughts, but also their resilience against forced social isolation and fear of contagion. Specifically, this real-world group experience during the COVID-19 era wanted to witness a stubborn attempt to contrast the general paralysis of mental healthcare interventions, which too much often had affected Italian DMHs during the intermittent waves of the pandemic [11]. Moreover, personal perspectives of inpatients as described in the Santi's Magazine advance our understanding of the usefulness of group activities also in a period of epidemic and forced interpersonal loneliness, provided that the meetings are carried out with all the necessary precautions [12]. Specifically, the subjective way inpatients experienced these interventions underlines how group activities are crucial in increasing patients' resilience [13], also (and above all) during a psychological condition of loneliness and terror due to the COVID-19 infection.

Finally, *limitations* of this group experience should also be acknowledged. First, our activity detection lacked a psychological and/or psychopathological assessment (e.g. scales for daily functioning or quality of life). Thus, further studies using specific psychometric evaluations are needed. In this respect, a tool for assessing anxiety related to the pandemic (such as the Italian version of the Fear of COVID-19 scale) [14] could also be useful to empirically test the hypothesis that the resumption of activities is a protective factor and that it may counter the risk of isolation. Second, although we choose a qualitative perspective, further research using more stringent phenomenological approach is needed. Moreover, our sample was small, being composed exclusively by eight subjects. Indeed, we described a pilot group experience during the second wave of the epidemic. Therefore, further studies on larger clinical population with severe mental illness during the COVID-19 era are needed.

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Conflict of interest

The Authors declare that there are no conflicts of interest.

Author's contributions

DP, EL and GP conceptualized the group activities. DV, MLT, SR and DM conducted group activities. DP, DV, MLT and SR collected the written group experiences. DV, MS, EM and LP wrote the first draft of the manuscript. All the authors contributed to enrich and approved the final version of the manuscript.

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Case study on psychological first aid on Italian COVID-Hospital

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SUMMARY

Coronavirus disease had an enormous impact on public health by affecting millions of people who have either fallen ill or died as a result of this disease. The pandemic resulted in several short- and long-term psychological effects, while restrictive measures adopted resulted in challenges in terms of support and counselling meetings, demonstrating the need to move to a digital health care system. In this context, the Psychological First Aid Service at Sant'Andrea, a service for COVID-19 patients and their loved ones, was set up in the Lazio region (Italy). The service provides two free telephone interviews, and if necessary, people are directed to other free support services in the region. In this article, we report a case study of two brothers who contacted the service during the second pandemic wave in Italy. The case has been discussed according to the recent literature, taking the practical and operational aspects of psychological first aid into account.

Key words: coronavirus, telemedicine, psychological support, telepsychotherapy, clinical psychology

Introduction

Since late 2019, coronavirus disease 2019 (i.e., COVID-19) has spread extremely rapidly around the world, and on 11 March 2020, the World Health Organisation [1] (WHO) declared a pandemic status. COVID-19 has affected daily life and slowed down the global economy; it also had an enormous impact on public health by affecting millions of people who have either fallen ill or been killed as a result of this disease. The most common symptoms are fever, cold, cough, bone pain and respiratory problems, which eventually lead to pneumonia. As a "new" viral disease that affected humans for the first time, vaccines were not yet available when it began to spread; therefore, the entire prevention system was based on extensive precautions, such as strict hygiene protocols (e.g., regular hand washing, avoidance of face-to-face interaction, etc.), social and interpersonal distancing, the use of face masks, and so on [2]. The pandemic resulted in several psychological effects (e.g., increases in anxiety, stress, obsessive compulsive disorder symptoms, insomnia) [3] in the general population across age groups [4-6] and different family and working conditions [6-8]. These effects were observed both in the short term and in the long term, and according to Inchausti et al. [9], it was possible to identify at least three main groups at risk of psychological distress during and after the COVID-19 pandemic: (1) health care workers who experience a higher frequency of exposure to the virus [10]; (2) individuals who, as a result of the pandemic, have been exposed to potentially traumatic events such as the loss of a loved one, threats to their health, or their ability to work [8,11,12]; and (3) people with pre-existing diagnosed psychiatric disorders, especially severe or complex ones [13,14].

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COVID-19 surprised the entire healthcare system and, in Italy, severely weakened it by turning hospitals into the only place to treat the virus in a very short amount of time. During the acute phase of the pandemic (early 2020), a concrete strategy was needed: creating COVID hospitals. COVID hospitals are healthcare facilities needed to deal with emergency situations, such as COVID-19, isolating patients and assisting them. These facilities were needed in order to dedicate only a few structures to managing COVID-19 and to guarantee the use of the other hospitals – which was necessary to provide health security for the population and to respond to new infections, avoiding the spread of the virus to all healthcare facilities. Later, given the higher number of infected patients, most Italian hospitals were converted to COVID hospitals.

In addition to the impact on hospital and physical health care, the rapid spread of COVID-19 has put a strain on the provision of mental health services, negatively affecting the capacity, responsiveness and availability of public and private health care systems worldwide [15,16]; it has also become clear that there is a need for a digital (TeleMedicine) rather than conventional healthcare system, which guarantees continuity of care and quality of care in synergy with the services provided in the presence of the patient [17]: the use of a digital psychological intervention that addressed problems that may occur due to the pandemic was crucial. Zhang et al. [18] suggested that any intervention during the period of the COVID-19 pandemic should focus on providing rapid adaptation skills and on psychological first aid (PFA). In the pandemic context where face-to-face meetings are extremely limited, increasing access to psychological therapies through technologically informed approaches (telepsychotherapy) presents an opportunity to adapt to the provision of mental health services remotely while supporting patient choice regarding the modalities and flexibility of its provision [19]. During the COVID-19 pandemic, few studies were conducted on hospitalised patients; as noted by Cheng et al. [20], there were additional difficulties compared to a classic application of PFA after a disaster. First, there was a significant difference in the number of mental health professionals and the high demand among hospitalized patients. Second, patients' psychological symptoms changed rapidly, requiring interventions that adapted to these evolving demands at an early stage. Furthermore, the environment of the COVID hospital had an impact on the effectiveness of psychological interventions, and the emergency itself limited the application of face-to-face interventions; a potential solution to these problems was online psychological intervention.

For these reasons, a PFA service for direct and indirect victims of COVID-19 was developed by Sant'Andrea University Hospital in Rome to give patients the opportunity to benefit from remote specialist psychological support. Considering national measures adopted to prevent COVID-19 infection, this allowed victims to (1) receive psychological support without leaving their homes and (2) when necessary, give them the opportunity to continue psychological support for many sessions. The PFA protocol is intended to facilitate victims' contact with their support network, whether affective, family, social, or working. Indeed, adequate social support allows the victim to talk about themselves, to elaborate a coherent reconstruction of what happened, to express the emotions experienced, and to perceive the sympathy and solidarity around them.

Through the exemplification of a clinical case, we aimed to represent this remote PFA model in favour of indirect victims of COVID.

Main characteristics and procedure

Some structures of the Lazio Regional Health Service have activated a PFA service for the distress caused by the pandemic, including the Sant'Andrea University Hospital in Rome. The Psychological First Aid Service at Sant'Andrea (PFA-SA) was set up on 15 March 2020 with the activation of a dedicated telephone number and is reserved for COVID-19 patients and their loved ones. From 15 March 2020 to 15 May 2021, a total of 140 patients were admitted to the PFA-SA, 62 of whom were women and 78 men, with 50% in the 35-45 age group. The PFA is provided in the time slot from 8.00 am to 8.00 pm.

The theoretical model on which PFA-SA is based is that of McCabe et al. [21], which is an empirically-based model that consists of the following steps: 1. Initial contact (relationship establishment and stabilisation); 2. Brief assessment and triage; 3. Intervention; 4. Triage; 5. Referral, liaison, and support from a medical specialist; 6. Awareness and self-care.

Based on the theoretical model of McCabe et al. [21], it was also possible to integrate the PFA-SA protocol with more recent models specifically used in telepsychotherapy [22,23] to build an intervention model aimed at providing effective coping tools during periods of disruption, threat to one's life and the lives of loved ones.

The PFA-SA consists of two telephone contacts to draw up and guide the activation of the territorial network according to individual needs.

First contact

The patient calls the telephone number found on the reference portals of the Lazio Region service network mapping.

The PFA-SA is responded to by a trained psychologist who limits the victim's hyperarousal reactions through

emotional containment techniques (stabilisation, normalisation, and anchoring). The aim of the intervention is to reduce the present state of crisis and to restore the subject's level of pre-critical functioning in the shortest possible amount of time. Stabilisation is focused on the "here-and-now" [24] and has the aim of establishing safety in the areas of physical, cognitive-behavioural, interpersonal, and social functioning, as advocated by Herman [25]. Normalisation means the victim's understanding that their symptoms are "normal" in response to the traumatic event (legitimation of experienced symptoms [26,27]). Anchoring refers to the use of the technique of grounding, a particular type of coping strategy designed to immediately connect the person with the present moment, and which can be usefully applied in cases of misperception, confusion, and disorientation [28]. Grounding is a body-mind technique that comes from Lowen's [29] bioenergetics and allows one to recover resources by focusing on a relaxation experience that combines breathing with imagination. It is one of the rapid techniques recommended in emergency response and can be practised in any circumstance.

The psychologist uses psychoeducation, an evidence-based technique initially designed for patients, both with psychological disorders (e.g., schizophrenia, depression, eating disorders) and physical illnesses, and for their relatives as well [30,31]. Psychoeducation consists of helping the patient understand how their exposure to the situation may impact their functioning (e.g., causes and effects of anger) and emotional validation (e.g., anger is a normal reaction to stressful conditions) to facilitate emotional containment and acceptance. Psychoeducation therefore provides information on how this impact can be reduced and what strategies can be implemented to cope with such experiences [32] and has proven to be an effective approach in reducing the negative effects of trauma [32,33].

If necessary, a second contact was arranged with the patient, agreeing with him when to perform the second intervention.

Second contact

The aim of the interventions is to normalise affective reactions and, in accordance with the patient's condition, promote personal coping strengths related to caring behaviours. Particular attention is given to the subjective distressing experience resulting from the emotions felt by the pandemic situation. The aims are shared and, if necessary, the local psychosocial network is activated. In fact, if there is a need to continue psychological support (as in step 5 of McCabe and colleagues [21]), the patient is referred to free psychological support provided locally (e.g., ANIACARES, developed several years ago to support road victims and later expanded to support COVID victims) [34,35].

A case study

In December 2020, during the second pandemic wave in Italy (November 2020 - March 2021), the PFA-SA service was contacted by two brothers, S. and V., aged 18 and 20, respectively.

The first request was addressed to obtain information about the functioning of the service and the justification of psychological support needed. During this first contact, the characteristics of the PFA-SA service were described; therefore, contact was established with the two brothers, a welcoming activity took place, and the events that led to the perception of frustration, distress and emergency-oriented thoughts (the reason for calling) were explored. The main objective of this early stage was reassurance, containment of distress, emotional support, and assurance of confidentiality.

The breaking event occurred a few hours before the request, i.e., the two brothers living with their parents learned about the molecular swab positivity of their parents, who had been suffering from mild symptoms in the previous days. The brothers, in agreement with their parents, decided to move away from their house of residence to settle in a second home, especially because of the vulnerability of V. who, being affected by an oncological disease, was more fragile and immune-compromised in the case of a contagion.

An exploratory phase began concerning experienced emotions and experienced reactions. Regarding the experienced emotions, anxiety of separation from the parents affected by COVID emerged, distress for a potential contagion of the more fragile subject, and intense distress of the sibling and caregiver, who did not perceive himself as able to cope with the family situation. Regarding the experienced reactions, at the beginning a total emotional absorption from the event was experienced, with loss of awareness of the surrounding environment. The siblings described feeling estranged from the home where they went and were unable to unpack, feeling frozen. S. complained of insomnia and intrusive dreams several days before the swab results. Both showed depressed mood, sadness, anger, guilt, and shame. Hypervigilance, increased sensitivity to potential threats and an amplified state of alarm prevailed in S.

During the interview, the prevailing anxieties of the two brothers resided in forced estrangement from their parents, who, both being positive for COVID-19, remained in a different house, with symptomatology that could be managed from home. The brothers' main request was to obtain information on how to psychologically support their parents from a distance and to discuss the usefulness of their choice in emotional terms. They were both reassured about the choice they made and were encouraged to work on settling in the chosen home;

also, they were made aware of their own thoughts and feelings. The psychologist who intervenes conducted psychoeducation and normalisation of the emotions felt by the two brothers; in particular, they were guided in the recognition and verbalisation of their emotions. They were given practical indications with respect to managing separation anxiety from the parents, suggesting the use of video calls with them. Separate interviews were also held with each of them, and S.'s intense anxieties were collected, while V. employed functional coping strategies, both problem- and emotion-oriented. A new telephone appointment was agreed upon after 2 days.

After the 2 days had passed, the two brothers reported feeling more serene, above all reassured by the result of their molecular swab, in which both were negative, and by the general stable condition of the parents, who did not seem to developed a worsening of their symptoms. A separate interview was held with each of them.

V., who suffers from oncological pathology, appeared to be the reference point for his brother S. and reported that he was very worried about his brother's depressive reaction; although V. was already followed up by a psychologist specialising in psycho-oncology at the hospital division where he is treated, he had not yet contacted her because he also wanted to give a listening space to his brother and therefore to have access to a new service dedicated to the family. At this stage, the psychologist reinforced V. to take note of his own effective abilities to cope with the present situation. Additionally, V. was encouraged to contact the psycho-oncologist, and he was reassured that S. would be directed to a psychological service in the territory (ANIACARES).

An interview was held with S., who appeared worried about the persistence of insomnia, a lack of appetite and generalised anxiety. S. wanted to deepen the emotional theme of the family context and reported that he has always grown up surrounded by a constant threat of emotional loss and anxiety of death (the theme of separation anxiety thus appears to be recurrent in the S's life, independent of COVID, but aggravated by it), he reported that his brother V. fell ill as a child and that he has always feared losing him, and in particular he has always seen his parents anguished and suffering because of V.'s illness.

Thus, there was a re-actualisation of the anxiety of death (re-actualisation of S.'s death anxiety is related to her brother's prior oncology pathology exacerbated by the COVID situation and the increased risk that COVID may be nefarious to her brother), the perception of loneliness and the sense of impotence felt towards V. and, in addition, the fear of not being able to be a support for his brother in case of illness.

From this call, the need for a recommendation to a support service in the territory emerges, as S.'s emotional and affective fragility emerged, triggered by his parents' contagion. They were contacted by the service again after a week (follow-up) to monitor the state of psychological well-being of the two brothers, and whether they had followed the indications from the PFA-SA psychologist, both of whom had; in fact, V. reactivated the support pathway with the psycho-oncologist, and S. made an online appointment with one of the ANIACARES psychotherapists. They felt serene about everyone's stable state of health and were waiting for the parents to be negative so they could meet again and come back home.

Conclusions

The COVID-19 pandemic has proven to be a major challenge for mental health services, highlighting the need to implement resources for psychological support and services, as well as resources for the diagnosis and treatment of psychopathologies.

The possibility of providing not only face-to-face but also online interventions will play a key role in the case of future emergencies that require exclusively or predominantly online assistance, providing support to those who require it; this also highlights another advantage of online psychological interventions, i.e., its flexibility.

The PFA-SA is a psychological first aid protocol specifically formulated and adapted to intervene and provide psychological support to direct and indirect victims of COVID-19. The strength of the project is to support victims during the earliest stages of the traumatic experience, offering the possibility of support in a remote mode, as well as offering victims who show additional support needs the possibility of being referred to other territorial projects or specialists. The benefits of the spread of PFA-SA, as well as similar programs, are several: to limit the impact of emotional distress of victims, which in turn could limit the onset of psychopathologies related to the traumatic event; to promote compliance with medical treatment and facilitate the recovery processes; to lighten the workload of hospital staff (doctors and nurses) and rescue personnel who could focus on their tasks, "delegating" the support and psychological support that victims need to specialists.

The development of PFA services delivered through audio and/or video calls, combined with psychoeducational material, may be a fundamental contribution in identifying mental health problems that could go unrecognised during crisis situations, such as COVID-19 [36].

As highlighted by Cheng et al. [20], the effectiveness of PFA by remote modality may be hampered by a potential difficulty in understanding the patient's stress symptoms and general condition compared to traditional methods. Moreover, online communication could interfere with the process of establishing trust and a therapeutic al-

liance between the psychologist and the user, which is essential for the intervention to be effective. However, the results of a recent review [29] showed that there is no significant difference in interactional characteristics between telephone and face-to-face therapies, including regarding therapeutic alliance, communication, empathy, attention or participation. Irvine and colleagues [37] aimed to emphasize that these interventions need to be flexible to adapt to the characteristics of the emergency and take the availability of personnel into account [20]. In addition, governmental and financial support for these initiatives, as well as the presence of volunteers and experts in the organisation of these services, appear to be of fundamental importance [37].

Ethical consideration

The Institutional Review Board of Department of Psychology, University of Rome "Sapienza" (protocol number 2414/2019) approved the procedures.

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Conflict of interest

The Authors declare no conflict of interest.

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The Authors contribuited equally to the work.

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