Research article
Ερευνητική εργασία

Sleep problems six-months after continuous earthquake activity in a Greek island

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Psychiatriki 2018, 29:25–33

Natural disasters, such as earthquakes, are traumatic events causing both acute and enduring stress to affected individuals. Psychosocial consequences include posttraumatic stress disorder (PTSD), reactions of anxiety and depression and sleep problems. The island of Cephalonia in Ionian Sea is characterized by its high seismic activity. More specifically, this activity has been considered to be the highest of the Balkan Peninsula and Europe in general. In January and February of 2014 a long sequence of earthquakes, which included two main shocks of 6.1 Richter and 6.0 R, struck the island. The epicenter of the earthquake was the city of Lixouri. A long series of aftershocks measured ≥ 4.0 R followed these main shocks. In total, the number of earthquakes that affected those living in Cephalonia between January 26 and August 2014 when the present study took place, was 2055. Several damages concerning buildings, monuments and churches, stonewalls, road networks and port facilities occurred, but there were no human casualties. The aim of the present study was to assess sleep problems, insomnia in particular in the affected population after the two severe earthquakes in the island of Cephalonia. The assessment was made through the Athens Insomnia Scale (AIS). Sleep problems were assessed for two time points, i.e., retrospectively one month before and six months after the earthquake. In terms of psychopathology, anxiety (STAI – State anxiety) and symptoms of depression (CES-D) were more pronounced in our study population than the expected norm in the community. Correlations with depression (Center for Epidemiological Studies-Depression), anxiety (State-Trait Anxiety Inventory – State Anxiety) and PTSD symptoms (Impact of Event Scale-Revised) were investigated. A significant increase of sleep problems pertaining to insomnia was found ($p<0.001$). The most frequent complaints were difficulty with sleep induction, awakenings during the night, and sleepiness during the day. Higher STAI – State anxiety, CES-D, and IES-R scores were associated with greater likelihood of having insomnia six months after the earthquake. No other significant associations were detected with several recorded sociodemographic parameters. In conclusion the local population exhibited sleep disturbances 6 months after the earthquake. Sleep problems and ensuing next day dysfunctioning appear to be dependent on the existing psychopathology but independent of sociodemographic factors, and are potentially the result of constant worry due to the continuing seismic activity. Therefore, mental health providers should recognize and manage disordered sleep after earthquakes, although further studies are required to investigate the long-term impact of natural disasters on sleep.

Key words: Natural disasters, earthquake, sleep problems, insomnia.

Introduction

The island of Cephalonia in Ionian Sea is characterized by its high seismic activity. More specifically, this activity has been considered to be the highest of the Balkan Peninsula and Europe in general.[1] Cephalonia's most destructive earthquake of the past century occurred in 1953 causing 455 deaths and 4,400 serious injuries. Since then a serious number of earthquakes have occurred. In 2014 a long sequence of earthquakes –which included two main shocks of almost the same magnitude– struck the island. The epicenter of the earthquake was the city of Lixouri and the western part of Cephalonia was mostly affected. A long series of aftershocks followed these main shocks. The first earthquake of a magnitude of 6.1 R on the Richter scale struck on January 26 at 15:55 local time, damaging reinforced concrete buildings, monuments and churches, stonewalls, road networks and port facilities. The aftershock sequence included approximately 731 seismic events, of which thirty-one had a magnitude ≥4.0 R (maximum 5.3 R). On the 3rd of February, eight days after the major earthquake and at 05:08 local time, a second 6.0R earthquake struck the island at the same area exacerbating previous material damages, without human casualties. This earthquake's aftershock sequence included 427 seismic events during the next ten days; fourteen of the aftershocks measured ≥4.0 R. This high seismic activity continued, albeit in decreasing intensity, for six months till end of August 2014, when the present study took place. In total, the number of earthquakes that affected those living in Cephalonia between January 26 and August 2014 was 2055.[2]

Natural disasters, such as earthquakes, are traumatic events causing both acute and enduring stress to affected individuals. There are immediate threats, such as risk of death and risk of injury to oneself or a loved one, and enduring stressors such as housing, economic, social and emotional problems. Psychosocial consequences include post-traumatic stress disorder (PTSD), reactions of anxiety and depression, and comorbidities.[3–6]

Prominent sleep complaints in the aftermath of trauma, either isolated or in the context of PTSD, are also very common and disturbed sleep has been reported by several investigators[7–11] after various types of trauma, such as sexual abuse, war, car crashes, hurricanes and earthquakes. The most frequent self-reported complaints are difficulties in initiating and maintaining sleep, shorter sleep duration, restless sleep, daytime fatigue, nightmares and anxiety dreams.[12] Immediate and short-term post-trauma sleep problems have been often reported in the literature but only a few studies have investigated sleep complaints several months following a natural disaster.[13,14]

In the present study we assessed sleep problems, insomnia in particular, in the affected population of Cephalonia, retrospectively one month before and 6 months after the earthquake, and investigated their correlation with depression, anxiety and PTSD symptoms.

Material and method

Participants

A total of 220 residents were randomly selected from the municipal lists of the epicenter city of Lixouri. Of those selected, 50 subjects declined to participate either due to lack of time or other inconvenience, or were excluded from the study because they did not properly complete the administered questionnaires. Thus, 170 subjects were finally included in the study. The selected individuals were assessed through questionnaires either at home or at the local hospital, at their own convenience. The assessments were carried out by a general doctor and three mental health professionals 6 months after the earthquake. Informed consent was obtained from all participants.

Assessment

The assessment was made through the following psychometric scales:

The Athens Insomnia Scale (AIS),[15] a self-administered 8-item psychometric instrument based on the ICD-10 criteria for the diagnosis of insomnia, which measures sleep quality and quantity as well as next day subjective functioning. Each item is rated from 0–3 (0="no problem at all", 3="very serious problem"). In the present study, the cutoff point for the presence of insomnia was set at 8. Sleep problems were assessed for two time points, i.e., retrospectively (based on recollection) one month before and six months after the earthquake.

The Greek version of the Center for Epidemiological Studies – Depression (CES-D) questionnaire[16] was used for detecting depression in a general population sample.

The state anxiety subscale of the State-Trait Anxiety Inventory (STAI)[17] which has been validated in the Greek population[18] was used for the assessment of anxiety.

The 22-item Impact of Event Scale-Revised (IES-R) for the measurement of PTSD symptoms; the scale provides a total IES-R score, as well as subscores for intrusion, avoidance and hyperarousal symptoms.[19]

Statistical analysis

Continuous variables are presented with mean and standard deviations, while qualitative variables are presented with absolute and relative frequencies. For the comparisons of proportions chi-square test has been used. McNemar's test was computed to compare the presence of sleep complaints before and after the earthquake. Estimating equations were used to assess if changes in the presence of insomnia before and after the earthquake were significantly different between different demographic groups. Univariate logistic regression analyses were used to test the effect of the demographic factors on insomnia, followed by multiple logistic regression analysis in a stepwise method (p for removal was set at 0.1 and p for entry was set at 0.5), based on which odds ratios (OR) with 95% confidence intervals (95% CI) were computed. All p values reported are two-tailed; statistical significance was set at 0.05. Analyses were conducted using the SPSS statistical software version 19.0 (IBM Corporation, Armonk, New York).

Results

Data from 170 participants (37.9% men) from whom AIS measurements were obtained were analyzed. Sample characteristics are presented in table 1. The mean age of the participants was 41.1 years (SD=15.5 years). Almost half of the responders had more than 12 years of education and 58.8% were married. Physical health problems were stated by 12.9% of the sample, while mental health problems were mentioned by 4.1% of the participants (referring to the time of the assessment). The majority of the participants were either in their home or in another building during the earthquake. The mean STAI-State anxiety score was 44.1 (SD=10.9) suggesting clinically significant symptoms of anxiety, since a cutoff point of 40 on the STAI-State anxiety scale has been proposed as indicative of the presence of anxiety symptoms in the general

Table 1. Sample characteristics.*

	N (%)
Sex	
Men	65 (38.2)
Women	105 (61.8)
Age, mean (SD)	41.1 (15.5)
Age**	
<35	57 (33.5)
35–46	57 (33.5)
>46	56 (32.9)
Education (years)	
≤12	88 (54.7)
>12	73 (45.3)
Missing	9
Marrital status	
Single/Widowed	70 (41.2)
Married	100 (58.8)
Children	
No	65 (38.2)
Yes	105 (61.8)
Number of children, mean (SD)	2.2 (0.9)
Physical health problems	
No	148 (87.1)
Yes	22 (12.9)
If yes, do you receive any treatment?	
No	2 (9.1)
Yes	20 (90.9)
Mental health problems	
No	163 (95.9)
Yes	7 (4.1)
If yes, do you receive any treatment?	
No	1 (16.7)
Yes	5 (83.3)
Location during the earthquake	
In their home	156 (91.8)
In another building	3 (1.8)
In the street / open space	5 (2.9)
In a vehicle	3 (1.8)
Other	3 (1.8)
STAI-State anxiety score, mean (SD)	44.1 (10.9)
CES-D score, mean (SD)	20.7 (7.1)
IES-R total score, mean (SD)	4.7 (2.8)
IES-R Avoidance, mean (SD)	1.5 (0.9)
IES-R Intrusion, mean (SD)	1.6 (1.0)
IES-R Hyperarousal, mean (SD)	1.7 (1.0)

*At the time of the assessment
**Categorized according to tertiles

population.[17] The mean CES-D score was 20.7 (SD=7.1), which is well above the cutoff score of 16, that according to the literature[20] indicates a significant depressive symptomatology in a community sample.

The presence of insomnia as assessed by the AIS, for the total sample was 26.5% (95% Confidence Interval: 19.8–33.2%) before the earthquake and 55.3% (95% Confidence Interval: 47.7–62.8%) after the earthquake, indicating a significant increase in sleep problems (p<0.001). Regarding the specific sleep complaints ("marked" or "severe" problem) as reflected in the eight items of the AIS before the earthquake, these were particularly related to awakenings during the night, final awakening, and sleepiness during the day. Six months after the earthquake, the most frequent complaints were difficulty with sleep induction, awakenings during the night, and sleepiness during the day. The specific sleep problems are shown in table 2. There was a highly significant increase (p<0.001) in almost all sleep complaints after the earthquake. The percentage of increase in the presence of insomnia according to different demographic categories is shown in table 3; this increase did not differ between the different socio-demographic groups (p>0.05).

The results from univariate logistic regression analysis with dependent variable the presence of insomnia 6 months after the earthquake are presented in table 4. Higher STAI-State anxiety scores and higher CES-D scores were associated with greater likelihood of having insomnia after the earthquake; higher total IES-R scores and higher scores in all subscales were also associated with a greater likelihood of having insomnia after the earthquake. When multiple regression analysis was conducted with dependent variable the presence/absence of insomnia (based on the AIS cutoff for a diagnosis of insomnia) 6 months after the earthquake, it was found that STAI-State anxiety and total IES-R score were associated with greater likelihood of having insomnia after the earthquake [OR (95%CI): 1.38 (1.15–1.66) and 1.06 (1.01–1.11) respectively]. When the dimensions “avoidance”, “intrusion” and “hyperarousal” were used in multiple analysis instead of the total IES-R score it was found that “intrusion” (OR=2.18, 95%CI: 1.33–3.57, p=0.002),“avoidance” (OR=2.01, 95%CI: 1.27–3.17, p=0.003) and “hyperarousal” (OR=2.41, 95%CI: 1.51–3.84, p<0.001) were significantly and independently associated with greater odds of having insomnia.

Discussion

The main finding of the present study was a significant increase (p<0.001) of sleep problems, pertaining to insomnia, in a random sample of the adult population of the city of Lixouri in Cephalonia six months after the island was struck by two earthquakes (6.1 R and 6.0 R) followed by a long series of aftershocks. This increase was found to be closely associated with the presence of anxiety, depression and post-traumatic stress symptoms.

Table 2. Sleep complaints one month before and six months after the earthquake. Number of individuals (%) who estimate to have a "marked" or "severe problem" as assessed through the eight items of the AIS.

	Before	After	p*
AIS-8 items	N (%)	N (%)	
Sleep induction	22 (12.9)	59 (34.7)	<0.001
Awakenings during the night	32 (18.8)	59 (34.7)	<0.001
Final awakening	27 (15.9)	47 (27.6)	0.004
Total sleep duration	20 (11.8)	46 (27.1)	<0.001
Sleep quality	19 (11.2)	47 (27.6)	<0.001
Well-being during the day	23 (13.5)	46 (27.1)	<0.001
Functioning during the day	19 (11.2)	39 (22.9)	0.001
Sleepiness during the day	27 (15.9)	52 (30.6)	<0.001

*McNemar’s test

Table 3. Subjects diagnosed with insomnia according the AIS scoring before and after the earthquake, according to various socio-demographic variables.*

	Insomnia		(%) Change	p*
	Before	After		
	N (%)	N (%)		
Sex				
Men	18 (28.1)	33 (51.6)	23.5	0.237
Women	27 (25.7)	61 (58.1)	32.4	
Age**				
<35	12 (21.1)	33 (57.9)	36.8	0.230
35–46	19 (33.3)	32 (56.1)	22.8	
>46	14 (25)	29 (51.8)	26.8	
Education (years)				
≤12	31 (35.2)	54 (61.4)	26.2	0.470
>12	13 (17.8)	35 (47.9)	30.1	
Marrital status				
Single/Widowed	18 (25.7)	39 (55.7)	30.0	0.767
Married	27 (27)	55 (55)	28.0	
Children				
No	14 (21.5)	38 (58.5)	37.0	0.084
Yes	31 (29.5)	56 (53.3)	23.8	
Physical health problems				
No	41 (27.7)	85 (57.4)	29.7	0.847
Yes	4 (18.2)	9 (40.9)	22.7	
Mental health problems				
No	41 (25.2)	90 (55.2)	30.0	0.072
Yes	4 (57.1)	4 (57.1)	0.0	
Location during the earthquake				
In their home/another building	44 (27.7)	91 (57.2)	29.5	0.985
Other	1 (9.1)	3 (27.3)	18.2	

*At the time of the assessment

**Effects reported are significant differences between groups in the degree of change in insomnia proportions

Sleep problems subsequent to the exposure to natural disasters are well documented.[14,21,22] Extreme stress may have both a short-term and a long-term impact on sleep. However, the long lasting effects on sleep have been investigated by rather few longitudinal studies.[6,14,13,23] In this context, various predictive factors of sleep disturbances have been investigated, such as proximity to the earthquake's epicenter, extent of material and human losses, socio-demographic characteristics, and coexisting psychopathology (anxiety, depression, and PTSD symptoms in particular).

In our study, proximity to epicenter and extent of losses were not assessed, since all participants came from the same area at the earthquake epicentre, where the majority of aftershock quakes also occurred, but there were no widespread material losses nor any human casualties. This should be attributed to the fact that the majority of the buildings after the 1953 catastrophic quake had been constructed according to and following strict anti-seismic regulations and specifications and therefore responded well during the earthquakes; thus, not one of them collapsed and none of the residents were killed or seriously injured.[2] However, the continuing seismic activity kept residents in a state of constant worry and caused them to wake up repeatedly during the night hours. There follows that the relatively most frequent complaints

Table 4. Univariate logistic regression analysis with dependent variable the presence of post-earthquake insomnia.

	Insomnia after the earthquake		OR (95% CI)*	p
	No	Yes		
	N (%)	N (%)		
Sex				
Males	31 (48.4)	33 (51.6)	1.00**	0.407
Females	44 (41.9)	61 (58.1)	1.30 (0.70 – 2.43)	
Age, mean (SD)	43.0 (17.4)	39.6 (13.7)	0.99 (0.97 – 1.01)	0.157
Age				
<35	24 (42.1)	33 (57.9)	1.00	
35–46	25 (43.9)	32 (56.1)	0.93 (0.44 – 1.96)	0.850
>46	27 (48.2)	29 (51.8)	0.78 (0.37 – 1.64)	0.514
Education (years)				
≤12	34 (38.6)	54 (61.4)	1.00	0.089
>12	38 (52.1)	35 (47.9)	0.58 (0.31 – 1.09)	
Marrital status				
Single/Widowed	31 (44.3)	39 (55.7)	1.00	0.927
Married	45 (45.0)	55 (55.0)	0.97 (0.53 –1.80)	
Children				
No	27 (41.5)	38 (58.5)	1.00	0.514
Yes	49 (46.7)	56 (53.3)	0.81 (0.44 – 1.52)	
Physical health problems				
No	63 (42.6)	85 (57.4)	1.00	0.151
Yes	13 (59.1)	9 (40.9)	0.51 (0.21 –– 1.28)	
Mental health problems				
No	73 (44.8)	90 (55.2)	1.00	0.920
Yes	3 (42.9)	4 (57.1)	1.08 (0.24 – 4.99)	
Location during the earthquake				
In their home/another building	68 (42.8)	91 (57.2)	1.00	0.067
Other	8 (72.7)	3 (27.3)	0.28 (0.07 – 1.10)	
STAI-State anxiety, mean (SD)	39.1 (10)	48.3 (9.8)	1.10 (1.06 – 1.14)	<0.001
CES-D score, mean (SD)	18.5 (4.9)	22.6 (8.1)	1.11 (1.04 – 1.18)	0.002
IES-R Avoidance, mean (SD)	1.2 (0.8)	1.8 (0.9)	2.32 (1.58 – 3.41)	<0.001
IES-R Intrusion, mean (SD)	1.1 (0.9)	2.0 (1)	2.69 (1.84 – 3.93)	<0.001
IES-R Hyperarousal, mean (SD)	1.2 (0.8)	2.1 (1)	2.89 (1.98 – 4.22)	<0.001
IES-R total score, mean (SD)	3.3 (2.3)	5.8 (2.7)	1.46 (1.26 – 1.68)	<0.001

*Odds Ratio (95% Confidence Interval);
**Indicates reference category

regarding night sleep were difficulty falling asleep, nocturnal awakenings, and sleepiness during the day. Moreover, this particularity may explain the high percentage (55.3%) of insomnia observed in our sample.

The proximity to the earthquake's epicenter seems to be important in terms of symptom severity. A recent study[13] showed that two years after the L' Aquila (Italy) catastrophic earthquake, which caused the death of 309 people and more than 1,600 injuries, survivors continued to suffer from reduced sleep quality, as well as disruptive nocturnal behaviors; also, these problems were significantly correlated with the dis-

tance from the earthquake's epicenter, people, especially the elderly, living closer to the epicenter exhibiting more sleep problems. Also, in another study[24] among child and adolescent survivors two years after the 2010 Haitian 7.0 R earthquake, the distance from the earthquake's epicenter was crucial for the development of PTSD symptoms and depression, followed by high percentages of sleep disorders.

Several sociodemographic characteristics are well acknowledged[25–27] as potential risk factors for the development both of insomnia problems and increased responses to traumatic experiences. Women, older people, less privileged people with lower levels of education and income, and being divorced or widowed appear to be more vulnerable in developing these conditions. Furthermore, prior psychiatric disorders and physical health problems have been associated with the development of insomnia and post-traumatic stress reactions.[26–29] However, in the present study, individuals reporting insomnia six months after the earthquake did not differ from those without insomnia problems in any sociodemographic aspect, although in a previous retrospective study by our group[30] fifty years after the catastrophic earthquake in the same region in 1953, women were found to have considerably more often recurring dreams of the earthquake and overall distress than men. A possible reason for this is that living close to the epicenter of the earthquake and the lasting exposure to aftershocks minimizes the significance of these predisposing factors.

In terms of psychopathology, anxiety (STAI-State anxiety) and symptoms of depression (CES-D) were more pronounced in our study population than the expected norm in the community, and their severity was associated with a greater likelihood of having insomnia after the earthquake. Anxiety and depression are common findings after a natural disaster as shown by many investigators[6,24,31] also, those living in close proximity to the earthquake epicenter are at greater risk of developing such reactions.[32]

Regarding PTSD symptoms, we found that posttraumatic stress symptoms, as assessed through the IES-R, were associated with a greater likelihood of having insomnia six months after the earthquake. It is widely admitted that disturbed sleep is a most frequent posttrauma symptom either per se or as a feature of PTSD and other disorders as well; it is still debatable[33–35] whether sleep problems and PTSD are distinct or comorbid conditions. There are several theories regarding what cluster of PTSD symptoms is directly associated with sleep problems. The emotional processing theory of traumatic stress suggests that traumatic memory is activated by re-experiencing trauma related clues during sleep. According to this perspective intrusive PTSD symptoms are suggested to be more closely related to sleep problems.[36] However, there are studies[37] reporting a relationship with the PTSD hyperarousal and avoidance symptom clusters as well, which was also the case in the present study.

Study limitations

The main limitation of the study is that the comparison of insomnia symptoms before and after the earthquake is based on retrospective assessment of the presence of such symptoms (for the period before the event). It is possible that some of the subjects who rate as insomniacs in the pre-earthquake period are influenced by their current state at the time of assessment and that the percentage of insomnia before the earthquake is over-estimated.

The relatively small study sample recruited from the local population, the assessment of sleep problems, in particular pertaining to insomnia without a detailed investigation of other sleep disorders, the lack of a thorough psychiatric evaluation of the participants, and the lack of information regarding previous traumatic events are also factors that limit the validity of our findings.

Concluding remarks

The 2014 earthquake that struck the island of Cephalonia had important repercussions on the local population, even though there were no human casualties. Adults living in the epicenter city area exhibited symptoms of depression, anxiety, post-traumatic symptoms, and enduring sleep disturbances 6 months after the earthquake. Sleep problems and ensuing next day dysfunctioning appear to be dependent on the existing psychopathology but independent of sociodemographic factors, and are potentially the result of constant worry due to the continuing seismic activity. Therefore, mental health providers should recognize and manage disordered sleep after earthquakes, although further studies are required to investigate the long-term impact of natural disasters on sleep.

Προβλήματα ύπνου έξι μήνες μετά από ισχυρή σεισμική δραστηριότητα στο νησί της Κεφαλλονιάς

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Ψυχιατρική 2018, 29:25–33

Οι φυσικές καταστροφές όπως οι σεισμοί μπορούν να δράσουν σαν τραυματικά γεγονότα που προκαλούν έντονη ψυχολογική δυσφορία. Υπάρχει αυξημένος κίνδυνος για την ανάπτυξη διαταραχής μετατραυματικού stress (PTSD), άγχους, κατάθλιψης και διαταραχών ύπνου. Η Κεφαλλονιά, νησί του Ιονίου πελάγους, είναι το πλέον σεισμογόνο μέρος της Βαλκανικής Χερσονήσου και γενικότερα της Ευρώπης. Στις 26 Ιανουαρίου 2014 το νησί χτυπήθηκε από σεισμό μεγέθους 6,1 Richter και στις 6 Φεβρουαρίου ακολούθησε ένας δεύτερος 6,0 R. Πλήθος μετασεισμών μεγέθους ≥4,0 R καταγράφηκε στο ενδιάμεσο των δύο και μετά τον δεύτερο μεγάλο σεισμό. Συνολικά 2055 μετασεισμοί είχαν καταγραφεί από τέλη Ιανουαρίου μέχρι τον Αύγουστο οπότε και διεξήχθη η παρούσα έρευνα. Οι σεισμοί προκάλεσαν σημαντικές υλικές καταστροφές χωρίς όμως να υπάρξουν ανθρώπινα θύματα ή σοβαροί τραυματισμοί. Σκοπός της παρούσας μελέτης είναι να αξιολογήσει τα προβλήματα ύπνου, κυρίως την αϋπνία, σε δείγμα 170 ατόμων – κάτοικοι όλοι της πόλης του Ληξουρίου, το οποίο ήταν το επίκεντρο του σεισμού. Χορηγήθηκε η Κλίμακα Αϋπνίας των Αθηνών (Athens Insomnia Scale), και εκτιμήθηκαν οι διαταραχές ύπνου για κάθε άτομο έναν μήνα πριν και έξι μήνες μετά από τους δύο ισχυρούς σεισμούς. Διερευνήθηκαν επίσης συσχετισμοί με την κατάθλιψη με την κλίμακα CES-D (Center for Epidemiological Studies-Depression), με το άγχος (State-Trait Anxiety Inventory – State Anxiety State) και τα συμπτώματα μετατραυματικού στρες – PTSD (Impact of Event Scale – Revised). Η μελέτη κατέδειξε μια σημαντική αύξηση των προβλημάτων ύπνου –κυρίως της αϋπνίας ($p<0,001$)– έξι μήνες μετά τον σεισμό. Οι συχνότερα αναφερόμενες δυσκολίες αφορούσαν στην έλευση του ύπνου, σε αφυπνίσεις κατά τη διάρκεια της νύχτας, και υπνηλία κατά τη διάρκεια της ημέρας. Από την άποψη της ψυχοπαθολογίας, το άγχος και τα συμπτώματα της κατάθλιψης ήταν περισσότερο έντονα στον πληθυσμό της μελέτης μας από τα αναμενόμενα σε κοινοτικούς πληθυσμούς. Τα υψηλά σκορ σε STAI – State anxiety, CES-D και IES-R συσχετίστηκαν με μεγαλύτερη πιθανότητα να υπάρχει αϋπνία έξι μήνες μετά τον σεισμό. Δεν ανιχνεύθηκαν άλλες σημαντικές συσχετίσεις με διάφορες κοινωνικο-δημογραφικές παραμέτρους που καταγράφηκαν. Συμπερασματικά, τα προβλήματα ύπνου φαίνεται να συνδέονται με την υπάρχουσα ψυχοπαθολογία και είναι πιθανό το αποτέλεσμα της συνεχούς ανησυχίας των κατοίκων λόγω της συνεχιζόμενης μετασεισμικής δραστηριότητας έξι μήνες μετά από τους δύο κύριους σεισμούς. Ως εκ τούτου, οι επαγγελματίες ψυχικής υγείας πρέπει να αναγνωρίζουν και να διαχειρίζονται τα προβλήματα ύπνου μετά από σεισμούς, αν και απαιτούνται περαιτέρω μελέτες για να διερευνηθεί η μακροπρόθεσμη επίδραση των φυσικών καταστροφών στον ύπνο.

Λέξεις ευρετηρίου: Φυσικές καταστροφές, σεισμός, προβλήματα ύπνου, αϋπνία.

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