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Cognitive behavioural intervention for health anxiety, somatosensory amplification, and depression in coronavirus disease 2019 anxiety: an interventional study in Iran

Zastosowanie interwencji poznawczo-behawioralnej w leczeniu lęku o zdrowie, amplifikacji somatosensorycznej i depresji u osób doświadczających lęku przed chorobą wywołaną przez wirus SARS-CoV-2: badanie interwencyjne w Iranie

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Abstract

The outbreak of coronavirus disease 2019 (COVID-2019) is associated with a certain kind of anxiety around coronavirus in healthy population. Coronavirus anxiety can put healthy individuals at a risk of false safety behaviours, which can bring corrosive consequences. The purpose of this study was to investigate the effectiveness of cognitive behavioural intervention for health anxiety, somatosensory amplification, and depression among healthy individuals with coronavirus disease anxiety in Iran. This study was conducted in Rasht, Iran, and included 150 college students aged between 18 and 32 years. In accordance with the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria for illness anxiety disorder and using 8 items of the Short Health Anxiety Inventory, which were adapted to coronavirus disease anxiety, the participants were randomly assigned into experimental group ($n = 75$) and waitlist control group ($n = 75$). The cognitive-behavioural intervention was provided for the experimental group participants in 10 90-minute sessions (5-day a week). The intervention was group-based and included the reduction of hypervigilance, amplification, and false safety-seeking behaviours. The Short Health Anxiety Inventory, Somatosensory Amplification Scale, and Beck Depression Inventory were completed by the participants before and after the intervention. Significant reductions were observed in health anxiety ($p < 0.01$), somatosensory amplification ($p < 0.01$), and depression ($p < 0.01$) for the experimental group. Given the contagious nature of illness anxiety and its negative consequences, it is essential to deal with coronavirus anxiety. Cognitive behavioural therapy is efficacious for coronavirus anxiety by reducing the catastrophic beliefs and false safety behaviours.

Keywords: COVID-19, cognitive behavioural therapy, health anxiety, somatosensory amplification, depression

Streszczenie

Wraz z wybuchem epidemii COVID-19 w zdrowej populacji pojawił się pewien rodzaj niepokoju związanego z koronawirusem. Lęk przed COVID-19 może skłaniać zdrowe osoby do zachowań fałszywie bezpiecznych, które mogą mieć negatywne skutki. Celem niniejszego badania była ocena skuteczności interwencji poznawczo-behawioralnej w leczeniu lęku o zdrowie, amplifikacji somatosensorycznej i depresji u zdrowych mieszkańców Iranu odczuwających lęk przed COVID-19. Badanie przeprowadzono w mieście Raszt (Iran) z udziałem 150 studentów w wieku od 18 do 32 lat. Zgodnie z kryteriami diagnostycznymi zaburzenia z lękiem przed chorobą (*illness anxiety disorder*, IAD), zawartymi w klasyfikacji zaburzeń DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition), oraz wynikami Kwestionariusza Lęku o Zdrowie (Short Health Anxiety Inventory), zawierającego 8 stwierdzeń dostosowanych do lęku przed chorobą wywołaną przez COVID-19, uczestników badania przydzielono losowo do grupy eksperymentalnej ($n = 75$) i grupy kontrolnej z listy oczekujących ($n = 75$). Interwencję poznawczo-behawioralną przeprowadzono w grupie eksperymentalnej w postaci dziesięciu 90-minutowych sesji (5 dni w tygodniu). Interwencja była oparta na modelowaniu grupowym i miała na celu redukcję nadmiernej czujności, amplifikacji somatosensorycznej oraz zachowań fałszywie bezpiecznych. Zarówno przed, jak i po interwencji uczestnicy badania wypełniali Kwestionariusz Lęku o Zdrowie, Skalę Amplifikacji Somatosensorycznej (Somatosensory Amplification Scale) oraz

Inwentarz Depresji Becka (Beck Depression Inventory). W grupie eksperymentalnej odnotowano istotne zmniejszenie lęku o zdrowie ($p < 0,01$), amplifikacji somatosensorycznej ($p < 0,01$) i depresji ($p < 0,01$). Biorąc pod uwagę zaraźliwy charakter lęku o zdrowie i jego negatywne konsekwencje, należy rozważyć działania mające na celu zmniejszenie lęku przed koronawirusem. Terapia poznawczo-behawioralna jest skuteczną metodą leczenia lęku przed COVID-19, gdyż pozwala na ograniczenie katastroficznych przekonań i zachowań fałszywie bezpiecznych.

Słowa kluczowe: COVID-19, terapia poznawczo-behawioralna, lęk o zdrowie, amplifikacja somatosensoryczna, depresja

What this paper adds

1. There is a kind of health anxiety about COVID-19 in healthy population that needs to be addressed.
2. This study provides evidence of similarity between COVID-19 anxiety and health anxiety.
3. Cognitive behavioural intervention can be effective for coronavirus anxiety in healthy population.

INTRODUCTION

The outbreak of coronavirus disease 2019 (COVID-19) started in Wuhan, Hubei Province, China, in December 2019. COVID-19 has spread throughout China and many other countries (World Health Organization, 2020) and then became a global health concern (Wang et al., 2020). The expansion of COVID-19 was so remarkable that the World Health Organization declared COVID-19 as the sixth public health emergency (Yoo, 2020).

In addition to preventing the spread of COVID-19, as the primary goal (Lai et al., 2020), reduction of anxiety around COVID-19 in healthy population is another main purpose that should be considered. Specific properties of COVID-19, including general and common symptoms and signs, such as fever and cough (Chen et al., 2020), person–person transmission (Jernigan, 2020), rapid spread, a pandemic potential (Lai et al., 2020), high reproduction rate (Wu et al., 2020; Zhao et al., 2020), fatal rate and failure in treatment (Lai et al., 2020), diverse demographic distribution (Wu and McGoogan, 2020), as well as rumors and misinformation around its origins (Calisher et al., 2020) have played an important role in causing COVID-19 anxiety among healthy population. In fact, certain characteristics of COVID-19 lead to the biased perception, interpretation, and understanding of the disease and its treatment (Leventhal et al., 1992), leading to health anxiety (Salkovskis et al., 2002) among healthy individuals.

Health anxiety (HA) or hypochondriasis refers to misinterpretation of the bodily sensations (Salkovskis et al., 2002). Individuals with health anxiety have dysfunctional beliefs on their health and mostly focus on bodily function, minor physical abnormalities, and ambiguous physical sensations (Abramowitz et al., 2007). In fact, the biased assumption on health, health concerns, and different perception of bodily variations are prominent aspects of health anxiety (Marcus et al., 2007).

Previous studies indicated that health anxiety is a common response during the early phase of pandemics (Barr et al., 2008; Bults et al., 2011; Cowling et al., 2010; Jones and Salathé, 2009; Saadatian-Elahi et al., 2010). In fact, the overhyped representation of a pandemic can be related to risk perceptions, anxiety, and behaviour changes in public (Rubin et al., 2009). The clinical presentation of COVID-19 is more pronounced in the early phase, which can lead to health anxiety in public.

Somatosensory amplification plays a specific role in health anxiety (Martínez et al., 1999). It can be characterised by a tendency to experience normal somatic and visceral sensations as intense, noxious, and disturbing (Barsky et al., 1988). Body awareness, symptom labelling, and anxiety are the most important aspects of somatosensory amplification (Köteles and Doering, 2016). Several studies by Barsky et al. (1988), Barsky and Wyshak (1990), Barsky et al. (1990), and Barsky (1992) confirmed the important role of somatosensory amplification in the development of health anxiety. Moreover, previous studies indicated an increase in somatosensory amplification following epidemic diseases (Ng et al., 2006). In fact, increase of somatosensory amplification is another important issue to be considered in COVID-19 anxiety.

In addition to health anxiety and somatosensory amplification, depression can be considered as related to COVID-19 anxiety. Also, depression is classified as a mood disorder, which includes sense of failure, self-accusation, guilt, irritability, somatic preoccupation, fatigability, and loss of libido (Beck and Steer, 1993; Beck et al., 1996, 1988). Moreover, depression is known as one of the most important disaster-related mental health issues (Makwana, 2019; Person et al., 2006). Findings of previous studies indicate that depression is a prominent mental issue during pandemics (Douglas et al., 2009). In addition, studies by Klokk et al. (2010), Marcus et al. (2008), and Uçar et al. (2015) showed a relationship between depression and health anxiety.

Based on the literature related to the prominence of health anxiety, somatosensory amplification, and depression in pandemics, it is essential to find interventions related to COVID-19 anxiety. Meanwhile, cognitive behavioural therapy (CBT) can be proposed for COVID-19 anxiety. Also, empirical evidence supports the cognitive behavioural model of health anxiety (Leonidou and Panayiotou, 2018; Rimes et al., 2006; Taylor, 2004). According to a systematic review by Leonidou and Panayiotou (2018), attention, memory and interpretation biases, perceived awareness and inaccuracy in the perception of somatic sensations, negativity bias, emotion dysregulation, and behavioural avoidance

are the most important mechanisms in cognitive behavioural model of health anxiety. Moreover, considering the studies by Barsky and Ahern (2004), Greeven et al. (2007), Hedman et al. (2016), Salkovskis et al. (2003), Seivewright et al. (2008), Sørensen et al. (2011), and Sumathipala et al. (2008), it can be assumed that cognitive behavioural intervention can be effective in healthy individuals with COVID-19 anxiety.

In general, COVID-19 anxiety can prompt cognitive bias (Mathews et al., 1997), threat-related attention bias (Mogg and Bradley, 2018), false safety behaviours (Riccardi et al., 2017), and disruptive behaviours (Bubier and Drabick, 2009) in healthy individuals with severe COVID-19 anxiety. Regarding the outbreak of COVID-2019 and the associated anxiety in accordance with that, it is essential to propose an intervention to reduce COVID-19 anxiety in healthy population.

MATERIALS AND METHODS

Participants

The study was conducted among college students of University of Guilan in Rasht, Iran. According to the DSM-5 criteria for illness anxiety disorder (American Psychiatric Association, 2013), considerations on illness anxiety (Almalki et al., 2016; van den Heuvel et al., 2014), and by the use of 8 items of the Short Health Anxiety Inventory, which were adapted to coronavirus disease anxiety (e.g. I usually feel at high risk for developing coronavirus disease), 150 participants were recruited by convenience sampling method. After sampling, the participants were randomly assigned into two groups: an experimental group (n = 75) and a waitlist control group (n = 75). Inclusion criteria were as follows: (a) significant coronavirus anxiety; (b) age between 18 and 30 years; (c) permanent residence in the immediate area; and (d) a written consent. Exclusion criteria were as follows: (a) receiving an active psychological treatment; (b) absence in more than two sessions; (c) causing problems in the intervention process; and (d) reluctant to cooperate.

Cognitive behavioural intervention

The cognitive behavioural intervention was based on the previous treatment protocols used for health anxiety. CBT consists the following components: shared understanding (Salkovskis et al., 2003), challenge of the tenability of the automatic thoughts and assumptions (Greeven et al., 2007), attention and bodily hypervigilance, amplification of the symptoms (Barsky and Ahern, 2004), positive appraisal, non-catastrophic beliefs, less threatening explanation, reduction of false safety-seeking behaviours (Sørensen et al., 2011), corrosive effects of avoidance and false safety behaviours (Hedman et al., 2016), reduction of excessive medical information searching and the unstructured visits (Sumathipala et al., 2008), coping with the illness anxiety (Barsky and Ahern, 2004), and mindfulness training (Hedman et al., 2016; Seivewright et al., 2008; Sørensen et al., 2011). In addition, CBT was developed in accordance with the Labuda et al. (2018) recommendations.

The intervention was delivered by two CBT experts, who received an initial training on the cognitive behavioural model of illness anxiety (Abramowitz et al., 2007, 2002). In addition, they participated in a lecture on coronavirus disease 2019 delivered by a medical virologist to have a better understanding of the virus (Lai et al., 2020; Millán-Oñate et al., 2020; Ng et al., 2020). The cognitive behavioural intervention was provided for the experimental group participants during 10 90-minute sessions (5-day a week).

Prior to intervention, all participants completed a pre-test that included the Short Health Anxiety Inventory, Somatosensory Amplification Scale, and Beck Depression Inventory–Second Edition. At the end of the intervention, all participants completed a post-test that was identical with the pre-test.

Outcome measures

Short Health Anxiety Inventory: The Short Health Anxiety Inventory (SHAI) was developed by Salkovskis et al. (2002) to measure the exaggerated estimations of the likelihood and severity of having an illness, which is sensitive across the full range of intensity. Notably, the 18-item SHAI is a shorter version of the 64-item Health Anxiety Inventory (HAI). Accordingly, it is composed of 18 items that measure the illness likelihood, illness severity, and body vigilance. Each question in SHAI consists of a group of four statements rated from 0 to 3. The total score is between 0 and 54. Salkovskis et al. (2002) reported appropriate reliability, validity, and sensitivity to the treatment for SHAI. Abramowitz et al. (2007) investigated the SHAI's factor structure using exploratory factor analysis (EFA). In this regard, EFA results indicated three-factor solution for SHAI. The findings also confirmed the convergent, divergent, and predictive validities of the measure. The systematic reviews and meta-analyses by Alberts et al. (2013) also supported the good psychometric properties of SHAI. Also, in the present study, the SHAI was internally consistent (α = 0.85).

Somatosensory Amplification Scale: The Somatosensory Amplification Scale (SSAS) is a 10-item single-factor instrument for measuring the levels of visceral and somatic sensations and discomforts. It has a five-point Likert scale with response choices ranged from 1 to 5. The questionnaire yields a summed score with a range from 10 to 50. In this regard, higher scores express higher levels of somatosensory amplification. According to the Barsky et al. (1990), the SSAS had appropriate test–retest reliability (r = 0.79; p < 0.0001), internal consistency (α = 0.82), and validity. The findings confirmed the reliability and validity of the SSAS in Iranian (Aghayousefi et al., 2015), Japanese (Nakao et al., 2001), and Turkish (Güleç and Sayar,

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Variables		Groups	Mean	*SD*	K–S *Z*	*p*
Health anxiety	Pre-test	Experimental group	38.70	5.28	0.095	0.066
		Wait list control group	38.17	5.65	0.089	0.058
	Post-test	Experimental group	31.60	6.28	0.093	0.142
		Wait list control group	38.24	5.24	0.095	0.077
Somatosensory amplification	Pre-test	Experimental group	35.58	12.16	0.078	0.131
		Wait list control group	35.80	8.22	0.089	0.068
	Post-test	Experimental group	29.68	6.40	0.095	0.074
		Wait list control group	35.38	12.09	0.076	0.082
Depression	Pre-test	Experimental group	25.54	5.85	0.091	0.097
		Wait list control group	25.62	5.81	0.076	0.155
	Post-test	Experimental group	19.73	4.80	0.088	0.146
		Wait list control group	25.48	5.52	0.077	0.093

Tab. 1. Descriptive indices of study variables in experimental and waitlist control groups

2007) populations. Also, in the present research, the alpha reliability was 0.81.

Beck Depression Inventory–Second Edition: Beck Depression Inventory–Second Edition (BDI-II) is a 21-item depression screening instrument with each of its items rated with a set of four possible answer choices of increasing intensity. The BDI-II assesses the key aspects of depression such as the sense of failure, guilt, self-dissatisfaction, social withdrawal, and loss of libido (Beck and Steer, 1993; Beck et al., 1988). The response and rating format for the BDI-II is a 4-point scale (0 = least, 3 = most). Also, the items of BDI-II are summed to create a total score with a range of 0 to 63. Beck et al. (1996) defined four categories of depression: minimal (total raw score of 0 to 13), mild (total raw score of 14 to 19), moderate (total raw score of 20 to 28), and severe (total raw score of 29 to 63). Beck et al. (1996) reported a high internal consistency in both of the outpatient group ($\alpha = 0.92$) and the college student group ($\alpha = 0.93$). The results also indicated test–retest reliability of the BDI-II ($r = 0.93$). Moreover, the previous studies confirmed the reliability and validity of the BDI-II (Erford et al., 2016). Also, in the present study, the BDI-II was internally consistent ($\alpha = 0.89$).

RESULTS

The mean and standard deviation values of health anxiety, somatosensory amplification, and depression's pre-test and post-test scores in the experimental and waitlist control groups are presented in Tab. 1. In this table, the results of Kolmogorov–Smirnov test (K–S *Z*) are reported to verify the normal distribution of variables in these two groups. According to this table, the *Z*-statistic of Kolmogorov–Smirnov test was not significant for all the variables. Therefore, it can be concluded that the distribution of the variables is normal.

A multivariate analysis of covariance (MANCOVA) was used to investigate the effectiveness of cognitive behavioural intervention in health anxiety, somatosensory amplification, and depression of healthy individuals with high levels of coronavirus anxiety.

The results of Levene's test for the homogeneity of dependent variables variance in groups showed that the variances of health anxiety ($F_{1, 148} = 0.40$, $p = 0.528 > 0.05$), somatosensory amplification ($F_{1, 148} = 0.58$, $p = 0.457 > 0.05$), and depression ($F_{1, 148} = 1.215$, $p = 0.272 > 0.05$) were equal in these groups. Also, the results of M Box test for checking the equality of the covariance matrix of dependent variables between the experimental and waitlist control groups showed that the covariance matrix of dependent variables of these two groups was equal (M Box = 11.72, $F = 1.86$, $p = 0.210 > 0.05$). The significance level of Box test is greater than 0.05, and this assumption is established. The results of Chi-square and Bartlett's tests for sphericity or significance of the relationship among health anxiety, somatosensory amplification, and depression showed that this relationship was significant ($\chi^2 = 92.01$, $df = 5$, $p < 0.05$). Another important assumption of multivariate analysis of covariance is the homogeneity of regression coefficients. In addition, it should be noted that the test of homogeneity of regression coefficients was investigated through the interaction between dependent and independent variables (intervention method) in pre-test and post-test. The interaction of these pre-tests and post-tests with the independent variable was not significant, which indicated the homogeneity of the regression slope, so this assumption is established. Due to the assumptions of multivariate analysis of covariance, the use of this test will be permitted. Besides, multivariate analysis of covariance was performed to identify the differences between the groups (Tab. 2).

Test	Value	*F*	*p*	Effect value
Pillai's effect	0.453	39.49	0.001	0.453
Wilks lambda	0.547	39.49	0.001	0.453
Hotelling trace	0.829	39.49	0.001	0.453
Roy's largest root	0.829	39.49	0.001	0.453

Tab. 2. The results of multivariate analysis of covariance on mean post-test scores

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Variables	*SS*	*DF*	*MS*	*F*	*p*	Effect value
Health anxiety	1659.80	1	1659.80	53.44	0.001	0.27
Somatosensory amplification	1182.06	1	1182.06	12.69	0.001	0.08
Depression	1221.66	1	1221.66	56.57	0.001	0.28

Tab. 3. Results of univariate analysis of covariance on the mean of post-test scores of dependent variables in two experimental and waitlist control groups

According to Tab. 3, the results showed the effect of the independent variable on the dependent variables. In other words, there was a significant difference between the experimental and waitlist control groups at least in one of the variables of health anxiety, somatosensory amplification, and depression. Accordingly, 45% of total variances of the experimental and waitlist control groups were due to the independent variable regarding the calculated effect size. The statistical power of the test is also equal to one, indicating the adequacy of the sample size. However, in order to determine which domains are significant, univariate analysis of covariance was used in the MANCOVA, and the results are reported in Tab. 3.

According to Tab. 3, F statistic for health anxiety ($F = 53.44$), somatosensory amplification ($F = 12.69$), and depression ($F = 56.57$) was significant at 0.01 levels. These findings indicate that there is a significant difference between these two groups in terms of these variables. Also, according to the calculated effect size, small effect sizes were obtained for health anxiety, somatosensory amplification, and depression. Accordingly, it can be noted that the cognitive-behavioural intervention was effective for health anxiety, somatosensory amplification, and depression of healthy individuals with high levels of coronavirus anxiety.

DISCUSSION

To date, there have been no interventional studies conducted on COVID-19 anxiety. However, proposing an intervention to reduce such anxiety can prevent the maladaptive cognitions and behaviours. Accordingly, in the present study, we investigated the effectiveness of cognitive behavioural intervention on health anxiety, somatosensory amplification, and depression of healthy individuals with a high level of COVID-19 anxiety during the pandemic.

Anxiety is a common reaction to epidemic diseases (Wheaton et al., 2012). COVID-19, as an epidemic disease, can cause anxiety in healthy population, especially in the initial phase (Jones and Salathé, 2009). Meanwhile, health anxiety, somatosensory perception, and mood can be affected by anxiety. During pandemic, illness cognitions increase in people and affect their perceptions of illness and reactionary behaviours (Karademas et al., 2013). Moreover, people are anxious about their health, somatosensory signs are amplified, and therefore, they are depressed. Therefore, developing and proposing interventions to overcome health anxiety, somatosensory amplification, and depression in healthy individuals are vital.

In line with cognitive behavioural models in health anxiety (Leonidou and Panayiotou, 2018; Rimes et al., 2006; Taylor, 2004), our findings supported the cognitive behavioural nature of COVID-19. In fact, COVID-19 anxiety, like another kinds of health anxiety, has specific cognitive and behavioural components. Individuals with high levels of COVID-19 anxiety overestimate the probability of contracting COVID-19, exaggerate the seriousness of the disease, amplify their somatosensory signs, show excessive safety seeking behaviours, and search for reassurance.

Moreover, the results of this study can be compared with cognitive behavioural treatments on health anxiety. In agreement with the studies by Barsky and Ahern (2004), Greeven et al. (2007); Hedman et al. (2016), Salkovskis et al. (2003), Seivewright et al. (2008), Sørensen et al. (2011), and Sumathipala et al. (2008), our findings indicate that cognitive and behavioural intervention can be considered an effective treatment for COVID-19 as a specific type of health anxiety. In the present study, the intervention encouraged the individuals to question the tenability of the assumptions, reduce catastrophic beliefs and threat explanation, cope with illness anxiety, and train mindfulness. The intervention helped the individuals to reduce health anxiety, somatosensory amplification, and depression by teaching them how to control negative assessment and excessive avoidance, checking, and reassurance-seeking behaviours.

We find the findings of the present study to be highly relevant from a clinical perspective. Firstly, there is a kind of health anxiety about COVID-19 in health population that needs to be considered. Secondly, this study provides evidence of similarity between COVID-19 anxiety and health anxiety. Thirdly, cognitive-behavioural intervention can be efficacious for coronavirus anxiety in healthy population.

One of the limitations of the study was the use of convenience sampling method for recruiting the participants. The selection of patients was more opportunistic than systematic. Only two therapist provided the treatment. The measurements were not completely masked. In addition, it would also have been desirable to have a follow-up.

Findings of this trial support the importance of proposing a cognitive behavioural intervention for COVID-19 anxiety in healthy population. We concluded that cognitive behavioural intervention can be helpful for individuals who find it difficult to overcome COVID-19 anxiety.

Conflict of interest

The author declares no conflict of interest regarding the publication of this article.

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Ethical approval

All the ethical considerations, such as personal satisfaction, data retention and destruction, and the informed participation were taken into account in accordance with the declaration of Helsinki.

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