Original Article

The Efficacy of Internet-based Cognitive Behavioral Therapy on the Anxiety Disorders among Adolescent Girls

Abstract

Background: The prevalence of anxiety disorders among children and adolescents are found to be approximately between 8–12 and 5–10, respectively, and the long-lasting effects of such disorders can expose the sufferers to impairment and dysfunction in several areas of life the examples of which are poor educational performance, low self-esteem, and depression. The present study aims to evaluate the efficacy of internet-based, cognitive-behavioral therapy (ICBT) in treating the anxiety disorders among adolescent females. **Materials and Methods:** The sample included thirty girls aged between 10 and 18 years suffering from a variety of anxiety disorders, under pharmaceutical therapy and referred to clinics of child and adolescent psychiatry specialists in Isfahan. The sample was selected through diagnostic interviews by psychiatrists based on the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision; afterward, they were randomly assigned to either the experimental or the control groups. To evaluate the efficacy of an ICBT in reducing anxiety disorder symptoms, Screen for Child Anxiety Related Emotional Disorders questionnaire was administered among the patients both before and 4 weeks after the treatment. **Results:** The covariance analysis results aimed to compare the anxiety disorder score variations between the two groups which demonstrate the fact that anxiety disorder scores in these two groups differ from one another ($P < 0.001$). **Conclusions:** This study is comprised of two Conclusions.the significant reduction in the mean of anxiety disorders scores in the experimental group compared to those in control group can be indicative of the efficacy of ICBT. In addition the significant reduction in the average of anxiety disorders symptoms' scores according to the type of anxiety disorders in the experimental group, compared to those in control group, can be indicative of the efficacy of ICBT.

Keywords: *Anxiety disorders, internet-based cognitive behavioral therapy, internet therapy*

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Introduction

Anxiety disorders are the most prevalent psychiatric disorders. According to epidemiological surveys, one-third of the population is affected by an anxiety disorder during their lifetime. This kind of mental disorders is highly comorbid with other anxiety disorders and other mental disorders.[1] Anxiety disorders also are associated with considerable developmental, psychosocial, and psychopathological complications.[2]

Epidemiologic studies have reported the incidence of anxiety disorder to be 5.7%–17.7% in children and adolescents also it gets even more prevalent among girls in adulthood, causing a lot of trouble for health-care systems.[3] Moreover, significant associations were found between the anxiety disorders reported in adolescence and later risks of anxiety disorder; major depression; nicotine, alcohol, and illicit drug dependence; suicidal behavior; educational underachievement; and early parenthood.[4]

Studies show that continuity of anxiety disorders in adolescence would lead to significant clinical distortion or impairment of performances in several functional areas including social, educational, and occupational.[5]

There are typically various therapies available for different anxiety disorders which may prove effective. Pharmacological therapy SSRIs and beta blockers; cognitive-behavioral therapy (CBT); Gestalt therapy; intellectual and rational emotive behavior therapy; family counseling (systemic and holistic approaches); person-centered therapy; and behavioral counseling are the examples of available therapies for anxiety disorders.[6]

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It has been empirically demonstrated that CBT is effective in treating anxiety disorders.[7] CBT is commonly more cost-effective than other therapeutic options.[8] This therapeutic method has been based on change in unsteady negative behaviors and thinking patterns. It suggests that although patients are not able to get all the aspects of their immediate environment under control but they can control how to interpret and deal with the issues that exist in this environment.[9]

Considering the significant development of technology and internet and its application in human life in particular, several media have recently focused on various aspects of internet-based interventions in the domain of mental health. For many of the disorders, therapeutic interventions through internet can be regarded as the alternatives for more traditional face-to-face therapies. Most studies reveal the applicability of internet-based CBT (ICBT) for patients who have been deprived of access to in-person therapies, mainly in cases of depression, anxiety disorders, eating disorders, substance abuse, or even sleep disorders.[8,10]

ICBT is a psychological self-help program mediated through the internet, the patient being in contact through E-mail with the support person directing the therapy. ICBT usually comprised psychoeducation, exercises, and prevention of the recurrence of symptoms. Modules of the network program are thus the cornerstones of "live" CBT.[11]

ICBT is a promising treatment that may increase the availability of CBT for psychiatric disorders and other clinical problems. It seems that ICBT is as effective as conventional CBT for respective clinical disorder also the large effects and the limited therapist time required suggest that the treatment is highly cost effective for well-established indications.[12]

During ICBT, patients login regularly to a secure website over a specified period to access, read, and download online materials arranged into a series of lessons or modules. They receive homework assignments which they are expected to complete before the next module is available.[13] The ultimate goal of the present study is to evaluate the efficacy of ICBT in treating anxiety disorders among adolescent girls, compared to the control group.

Materials and Methods

We examined the effectiveness of ICBT compared to the control group in the present study. The research design was quasi-experimental based on pre- and post-test with the control group.

To estimate the sample size, according to experts, the inclusion of 15 members in each control and intervention group has a suitable adequacy for experimental or quasi-experimental studies.[14] Accordingly, thirty referring adolescent females with anxiety disorders were chosen by simple random sampling in accord with the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR) diagnosis criteria and were further divided into two groups of 15 randomly, making 15 participants in experimental group and 15 participants in control group. The average age of the participants was between 10 and 18 years old, while the average illness time varied between 3 and 24 months.

Inclusion criteria of the study were being female (given the fact that during this age, the therapy sessions are attended separately by males and females with the emphasis on female anxiety disorders), age of 10–18, being diagnosed with anxiety disorders, possessing average intelligence and above (on Wechsler Intelligence Scale), access to the internet, willingness to participate, and parents' consent. On the other hand, participants with factors such as limited or no access to the internet, unwillingness to participate, disagreement of parents, change in the antianxiety drugs, and having other psychological disorders such as psychotic disorders were excluded from this study.

Before the intervention, written consent based on the Helsinki ethical protocol was taken from the participants' parent, and all participants and their parents were ensured the confidentiality of research and its results.

Viewpoint was performed by following questionnaire:

In the present study, Screen for Child Anxiety Related Emotional Disorders (SCARED) questionnaire was employed. This evaluation is a self-report tool, designed to evaluate symptoms of anxiety disorders according to DSM-IV-TR criteria for children and adolescents between 8 and 18 years old. It comprised 71 items and five subscales (panic disorder, school avoidance, social anxiety, separation anxiety, and generalized anxiety), which are followed by three scales (0 = incorrect or rarely correct, 1 = sometimes correct, and 2 = correct or usually correct). The estimated validity was 0.86–0.94 while the reliability was estimated by Cronbach's alpha = 0.91, indicating appropriate internal integrity of SCARED questionnaire.[15]

ICBT is a psychological self-help program mediated through the internet, the patient being in contact through E-mail with the support person directing the therapy. The therapy plan in this study included seven stages, which took place in a 3-month period. Each stage of therapy and related assignments was updated in the corresponding weblog once every 2 weeks. Participants were required to type in the response to the assignments and reply the results through E-mail after each stage, prior to the next stage. Participants averagely took about 1 h a day for studding and doing the assignments of each stage. If they faced any questions or problems, they were able to easily share and ask their therapist through E-mail, Tango app, Skype app, or other social medias. The main source of the therapy protocol

was made by Gillian Butler at www.get.gg. The content of the seven stages was as follows: introduction to CBT, recognizing destructive thoughts, learning the connection between thoughts and emotions and how to change them, training for breaking deficient thought cycles replacing with positive attitudes, evaluating behaviors and ways to diffuse negative thoughts and challenges, and improving sleeping quality through teaching some techniques such as awareness, mental imaging, and relaxation techniques. Four weeks after the treatment, during the attendance meeting, posttest was administered among the both groups of patients.

To analyze the data, descriptive data including frequency tables, measures of central tendency, and distribution are used to describe the most important features of participants. To compare the changes in the two groups with the values gained before the therapy (comparing pre- and post-test), analysis of covariance (ANCOVA) test was employed. All the analysis was done using SPSS 20 (IBM Company, Armonk, New York, United States) software and statistical significance was set to 0.05.

Results

As it can be seen in Table 1, 30% of the participants were between 10 and 12 years, 40% were between 13 and 15 years, and 30% were between 16 and 18. The average age of the participants was 14.17 and the standard deviation was equal to 2.09 years. About 36.7% of them were in the lower socioeconomic status, 40% were in the middle socioeconomic status, and 23.3% were in the high socioeconomic status.

Furthermore, the results of paired samples t-test, performed to compare the variance of scores before and after intervention, indicated that the posttest scores of total anxiety disorder on the both groups are significantly higher than the pretest scores ($P < 0.001$) [Table 2].

The results of ANCOVA test, performed to compare the average variance in questionnaire between the two groups, indicated that the average variance in the experimental group was significantly higher than the control group ($F = 185.49$ $P < 0.001$) [Table 3].

In Table 4 it has been showed that the posttest scores according to the type of anxiety disorders, on the both groups, are significantly higher than the pretest scores. There was no significant relationship between age and socioeconomic status with covariate variables ($P > 0.05$).

According to Table 5, ICBT was effective on panic disorder ($F = 97.89$, $P < 0.01$), school avoidance ($F = 24.24$, $P < 0.01$), social anxiety ($F = 142.64$, $P < 0.01$), separation anxiety ($F = 85.56$, $P < 0.01$), and generalized anxiety ($F = 111.09$, $P < 0.01$).

Discussion

This study was aimed to examine the effectiveness of ICBT in the treatment of anxiety disorders in adolescents. In so doing, SCARED questionnaire was administered prior to and after ICBT among both control and experimental groups, moreover, pre- and post-tests were employed. The results indicated that ICBT was able to significantly reduce symptoms of anxiety disorders in the adolescents.

Anxiety disorder gets more prevalent among girls in adulthood, causing lots of troubles for health-care systems.[16] In addition, much research has shown the anxiety disadvantages for girls in mixed gender, compared to single-gender groups[17] since the mixed setting may suppress treatment effects for girls.[18] Several gender setting effects emerged from the studies indicated more social benefit for girls in single, compared with mixed gender settings. Girls were rated as displaying more assertiveness, self-management, and compliance in single compared to mixed gender settings.[19] Single-gender treatment may also provide more relevant social interaction for girls than mixed-gender treatment, and more opportunities arise for therapists to reinforce these behaviors.[20] Moreover, the efficacy of ICBT on the adolescent girls with anxiety disorders was the concern of some studies and therapists.

The findings of this study accord with other studies; researchers realized that ICBT has a significant role in treating anxiety disorders. For instance, Mewton *et al.* suggested the effectiveness of this therapy on adults' anxiety disorders such as general anxiety disorder, panic disorder, social anxiety disorder, obsessive–compulsive disorder, and specific phobias, compared to the control group.[21] Hedman *et al.* realized that employing ICBT was effective and economically sound in treating anxiety and depression disorders.[22] Furthermore, Andrews *et al.* (2010) employed computer-based therapy for anxiety and depression disorders.[23] Newby *et al.*, studying ICBT in treating anxiety and depression, asserted its effectiveness.[24] Spek *et al.* also confirmed the effectiveness of this therapy on anxiety and depression disorders.[25] Several studies

Table 1: Frequency, age, and socioeconomic status of the control and experimental groups					
Age	Frequency (%)		Socioeconomic status	Frequency (%)	
	Control group	Experimental group		Control group	Experimental group
10-12	4 (13.3)	5 (16.6)	Low	5 (16.6)	6 (20)
13-15	6 (20)	6 (20)	Middle	7 (23.3)	5 (16.6)
16-18	5 (16.6)	4 (13.3)	High	3 (10)	4 (13.3)
Total	15 (50)	15 (50)	Total	15 (50)	15 (50)

Table 2: Descriptive statistics of total anxiety disorder score in the experimental and control groups

Source	Mean±SD		Results of ANCOVA test (P)
	Control group	Experimental group	
Pretest	38.40±4.65	38.23±4.57	<0.001
Posttest	34.93±4.73	20.13±3.06	<0.001
Score variance during the study	4.13±3.00	18.87±4.55	<0.001

**Results of ANCOVA test. ANCOVA: Analysis of covariance, SD: Standard deviation

Table 3: Covariance analysis for the effect of internet-based cognitive behavioral therapy on anxiety disorders

Source	SS	df	MS	F	P	Eta
Anxiety disorder	354.06	1	354.06	105.51	0.001	0.76
Group	1631.33	1	1631.33	486.16	0.001	0.94
Error	90.59	27	3.35			
Total	24,830.0	30				

ICBT was effective on reducing anxiety disorders ($F=185.49$, $P<0.001$). ICBT: Internet-based cognitive behavioral therapy, SS: Sum of square, MS: Mean square

have been conducted on panic disorders. According to Bergstrom *et al.* (2009), ICBT has been effective for treating panic attacks while patients were under psychiatric observation.[26] Positive results were reported in the study of Carlbring *et al.* which was aimed to examine the efficacy of ICBT and complementary phone therapy on panic disorders.[27] Titov *et al.* examined the validity of ICBT on social anxiety disorders between control and experimental groups and found the great benefit of this treatment.[28] Carlbring *et al.* also conducted a 30-month-long study on ICBT of social phobias, indicating that the therapy leads to consistent results during long-term periods.[29] Andrews *et al.* studied the same subject, finding similar results.[30] Enander *et al.* found that ICBT is effective when it comes to anxieties related to deformed parts of the body.[31] Buhrman *et al.* conducted the study on controlling chronic pain items and found this treatment effective.[32]

However, this type of therapy suffers from some limitations. Andersson *et al.* suggested that there are disadvantages with not seeing the patient, information and knowledge about the characteristics of patients may unavoidably be lost.[13] Ybarra and Eaton also realized that given the fact that face-to-face communication is limited, internet-based therapies are insufficient for some patients.[33] Patients who use internet-delivered treatments represent a broad range of people. These include people with both low and high levels of education and different cultural groups. This represents a challenge for the design and delivery of ICBT[34] Moreover, limited knowledge about therapist factors which are widely held to be important in face-to-face treatments[35] Another disadvantage in ICBT is that patients with some

Table 4: Descriptive statistics of total anxiety disorder score in experimental and control groups

Source	Mean±SD		Results of ANCOVA test (P)
	Control group	Experimental group	
Panic disorder			
Pretest	8.60±3.26	8.73±3.47	<0.001
Posttest	7.86±2.85	5.73±2.40	<0.001
School avoidance			
Pretest	3.93±3.21	3.40±1.68	<0.001
Posttest	3.93±3.08	1.73±0.88	<0.001
Social anxiety			
Pretest	9.40±2.55	9.53±2.66	<0.001
Posttest	8.40±2.06	4.33±1.17	<0.001
Separation anxiety			
Pretest	7.60±2.55	7.06±2.73	<0.001
Posttest	6.86±2.47	3.66±1.54	<0.001
Generalized anxiety			
Pretest	8.86±3.04	9.60±3.58	<0.001
Posttest	7.86±2.53	4.66±1.87	<0.001

**Results of ANCOVA test. ANCOVA: Analysis of covariance, SD: Standard deviation

Table 5: Covariance analysis for the effect of internet-based cognitive behavioral therapy on anxiety disorders

Source	SS	df	MS	F	P	Eta
Panic disorder	121.5	1	121.5	325.53	0.001	0.93
Group	36.53	1	36.53	97.89	0.001	0.81
Error	8.58	23	0.37			
Total	1616	30				
School avoidance	100.61	1	100.61	113.8	0.001	0.83
Group	21.43	1	21.43	24.24	0.001	0.51
Error	20.33	23	0.88			
Total	421	30				
Social anxiety	22.25	1	22.25	24.12	0.001	0.51
Group	131.59	1	131.59	142.64	0.001	0.86
Error	21.22	23	0.92			
Total	1419	30				
Separation anxiety	78.16	1	78.16	111.67	0.001	0.82
Group	59.88	1	59.88	85.56	0.001	0.78
Error	16.09	23	0.7			
Total	1028	30				
Generalized anxiety	85.72	1	85.72	97.93	0.001	0.81
Group	97.24	1	97.24	111.09	0.001	0.82
Error	20.13	23	0.87			
Total	1394	30				

ICBT was effective on panic disorder ($F=97.89$, $P<0.01$), school avoidance ($F=24.24$, $P<0.01$), social anxiety ($F=142.64$, $P<0.01$), separation anxiety ($F=85.56$, $P<0.01$), and generalized anxiety ($F=111.09$, $P<0.01$). SS: Sum of square, MS: Mean square, ICBT: Internet-based cognitive behavioral therapy

diagnoses, will benefit less from a transdiagnostic than from a disorder-specific treatment, which this risk must be addressed by the provision of extramaterial which can be targeted toward specific needs[36] Clinicians may

feel threatened and fear losing their work as practicing psychotherapists if internet interventions are disseminated. Given the scarcity of trained clinicians and the large number of people in need of evidence-based psychological treatments, this is likely not well founded, and internet interventions should be regarded as a complement to other services rather than as a full replacement for face-to-face therapies (in particular for more severe patients).[8]

This study, like other studies, had limitations such as external credibility due to the fact that the population was mostly female adolescents, as well as the presence of disruptive factors such as homework and school plan of the patients and irresponsibility in handing in the assignments on time. Therefore, we suggest further studies on both males and females to raise the external credibility levels and given the limited number of studies conducted on this topic, more studies are required on different age groups, as well as different psychological disorders.

Acknowledgments

Conflicts of interest

There are no conflicts of interest.

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