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Effect of group cognitive behavioral therapy based on Hofmann model on anxiety symptoms and brain behavioral systems in adults suffering from social anxiety disorder

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Abstract

Introduction: Social Anxiety Disorder (SAD) as a negative emotion can be associated with specific patterns of brain behavioral system functions. The purpose of this research is to evaluate the effectiveness of Hofmann-based CBT (Cognitive Behavioral Therapy) in reducing anxiety symptoms and improving brain behavioral system functions in patients suffering from social anxiety disorder.

Materials and Methods: This research is a semi-experimental study with a pretest/posttest plan. 20 SAD patients were randomly selected and divided equally into two groups (experimental and control). The experimental group underwent 12 sessions of Hofmann-based CBT, whereas the control group was placed in the waiting list. Anxiety disorder Interview Schedule for DSM-IV (ADIS-IV), Social phobia questionnaire, and Gary-Wilson's personality questionnaire were used for evaluating results at pretests and posttests. Data were analyzed with descriptive indices and multivariate analysis of covariance (MANCOVA) by SPSS software.

Results: The experimental group showed significant improvement in total scores of social phobia, including fear (P<0.001), avoidance (P<0.001), and physiological discomfort (P<0.001)

Also, brain behavioral systems (including behavioral activation, behavioral inhibition, and fight/flight) showed significant improvement (P<0.001) in behavioral inhibition in the experimental group.

Conclusion: Cognitive behavioral therapy based on Hofmann model is effective in patients suffering from social anxiety disorder, especially in improving anxiety symptoms and behavioral inhibition functions.

Keywords: Behavior, Brain, Cognitive behavioral therapy Social anxiety disorder

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Introduction

Social Anxiety Disorder (SAD) is considered as one of the categories of anxiety disorders. DSM-V has defined some of the most important features of this disorder: phobia and anxiety in or from one or more social situations in which the individual may be negatively judged by others. These situations include meeting unknown people, being watched while eating and drinking, and speaking in front of others (giving speech). Almost always, social situations create fear and anxiety and a sort of avoidance. This fear, anxiety or avoidance may last for 6 months or more and disrupt the personal life and performance of the individual (1). DSM-V states that the 12 month prevalence rate of social anxiety disorder among Americans is about 7%. 12 month Prevalence rate among children and adolescents is similar to that of adults. In all age groups, prevalence rate has a negative correlation with age. In the case of aged adults, 12 month prevalence rate is between 2% to 5%. This disorder is more regularly seen in women (1.5 to 2.2 times more than men). Individuals suffering from social anxiety disorder are in danger of developing major depression secondary to social anxiety and reduced quality of life (3). Social anxiety

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is an ailment which starts gradually in adolescence and results in high levels of affliction (4). Social anxiety disorder has high simultaneity with other anxiety disorders such as behavioral disorders and disorders related to the misuse of drugs (1). 81% of those suffering from SAD have had another disorder too (5). Social anxiety may be inclusive and non-inclusive. In the inclusive type, fear exists in most of social circumstances. It has been proved that pupa is an area in the brain which plays an important role in fear circuitry in inclusive SAD and other types of anxiety (6). Rapee believes that social anxiety disorder is placed on a severity continuum. Kessler, McGonagle, Zhao and Nelson conducted a wide-ranging study and found that 12 month prevalence rate is 9.7% and lifetime prevalence is 3.13% (7). These findings show that after major depression (17%) and alcohol dependence (14%), social anxiety disorder is the third prevalent psychological disorder (8). Beliefs based on negative basis and stringent criteria are believed to play a key role in social and behavioral disorders (9). In examining the relationship between social anxiety and neurological structures, Gray's theory has been proposed. This theory proposes three emotional systems which are the basis of individual differences and the activation of each of these systems results in the calling of different emotional responses such as early arousal of anxiety and fear (10). The first system is the Behavior Activation System (BAS) which includes several dopaminergic pathways and corticosteroids in the brain. The neuro-anatomy of this system is situated in the frontal cortex and amygdala. The other two systems are Fight- Flight System (FFS) and Behavior Inhibition System (BIS) which is the result of the activity of afferent noradrenergic and serotonergic pathways. Its neuro-anatomy is in the hippocampal-parietal system of the brainstem, Papez circuit and orbito-frontal cortex. This system overlaps with systems in which anxiety plays a role. Therefore, the sensitivity of this system corresponds to anxiety, worrying and mental ruminations. These three systems are defined in behavioral, neurological and cognitive dimensions. Since the cognitive dimension is involved in these systems and BIS plays a role in mental ruminations, in addition to pharmacotherapy, one of the standard treatments for SAD is cognitive-behavioral treatment. Cognitive-behavioral Group therapy aims at breaking the vicious cycle of social anxiety by combining the cognitive structure with the methods of encountering danger. This therapy has three major elements: 1- confrontation with the fear-producing social situation in the session 2- cognitive restructuring, and 3- encountering the real situation and cognitive restructuring through self-administration. Hofmann believes that cognitive Behavioral Therapy (CBT) is an effective way of intervention in social anxiety which includes a wide range of interventions and therapies (15). There is still the need for conducting further research in this research area. In the evolution process of treatment patterns specifically for social anxiety, the Hofmann's model is referred to as a comprehensive and disorder-specific CBT model (15).

Hofmann introduces his new cognitive-behavioral therapy as the Social Self-reappraisal therapy (SSRT). He uses treatment techniques for reforming the cognition perception of the patient from his/her "self" in social situations. Therefore, Hofmann's model is a comprehensive model which uses indirect cognitive restructuring and confrontation with the situation. Special techniques are also used to repair "Negative Self-perception" (15). In Hofmann's model, "Self" has a more pronounced role compared to the former models. In this model, confrontation with Social Phobia Inventory (SPIN) is used. The main tool for change is gradual confrontation which refers to emancipation from an object or person which reduces distress but in the long-term, retains anxiety (16). Moreover, this model provides the patient with a new method for assessing disorder and helps the patient to forsake his old efforts for confronting problems and respond to the signs of fear in a different manner (17,18). This treatment model shows that social anxiety is accompanied by unrealistic expectations about social standards and defect in the selection of specific and achievable social goals. When the individuals suffering from SAD encounter challenging social situations, they clearly focus their attention on their negative aspects and negative social performance. Depending on the patient, this change of focus leads to the overestimation of a social confrontation's negative outcomes, perception of low emotional control, negative perception of self as a social creature, and perception of weak social skills. As results of these negative perceptions, those suffering from SAD wait for and predict their social errors and perceive these errors in a catastrophic way. To deal with the flow of social threats, Maladaptive

Coping Strategies are used, the most prominent of which are escape, avoidance and safety behaviors which get intensified and continue with the rumination after the event. Consequently, this rumination reinforces social anxiety in the future. Due to the significance of curing social anxiety disorder and its interwoven components and also the necessity for new treatment approaches, the current study aims at testing the effect of behavioral-cognitive group therapy on reducing anxiety signs and the brain and behavioral systems of those suffering from social anxiety disorder.

Materials and Methods

This research is a clinical trial (code: IRCT2014021214136N2) with pretests and posttests plan. The population of this study consists of all the outpatients suffering from social anxiety who visited the psychological clinic of the department of Education and Psychology at Ferdowsi University of Mashhad in the fall of 2013. First, using convenience sampling, 20 out of 80 patients were diagnostically interviewed using a structured interview which had the criteria of the Diagnostic and Statistical Manual of Mental Disorder. The existence of the criteria of social anxiety was investigated and those who suffered from SAD were selected and randomly divided into an experiment group (10 individuals: 6 female, 4 male) and a control group (10 individuals: 7 female, 3 male). These participants filled out Connor's social anxiety questionnaire and Gary Wilson's scale questionnaire. Afterwards, the participants were told that they are about to participate in a research study which aims at analyzing the effectiveness of a new treatment on SAD symptoms.

They were also ensured that the information would remain confidential and the results of the study would be published statistically and in the form of a general conclusion, not individual judgments. It was agreed that after the completion of the study, the control group would also undergo a period of cognitive-behavioral treatment based on Hofmann's model. Participants were not receiving any other psychological treatments during their participation in the sessions. The participants did not suffer from major depression, different types of psychosis and personality disorders. Then, the experimental group was given treatments for 12 two hour sessions in 12 weeks. Finally, after the sessions were finished, both groups participated in a posttest. The data of this research were analyzed using SPSS_16 software, descriptive statistics and multivariate analysis of variance.

Summary of the sessions

Session 1: establishing a therapeutic relationship, creating harmony in the group, introduction of the therapist and all the members, expression of rules and regulations, members share the goals, summing up of similarities by the therapist, discussion about the treatment model by the therapist, providing worksheets and booklets, explaining the role of avoidance in the maintenance of social anxiety (discussed by the therapist and presentation slides), assigning home works

Session 2 reviewing the homework of the previous session based on the worksheets and determining the factors resulting in the maintenance of social anxiety, reviewing the treatment model by group members, assigning home works

Session 3: reviewing the home works of the previous session, a presentation by all group members and giving positive feedback by the therapist and other members, assigning home works

Session 4: reviewing the treatment model by the members, reviewing the home works of the previous session, all members speak about a subject not determined before, assigning home works

Session 5: reviewing the home works of the previous session, making changes in the group and bringing in new people as audience and presentations given by the members, assigning home works

Session 6: reviewing the home works of the previous session giving speech and the intervention of the therapist and other members to create more anxiety, reviewing the treatment model by the members

Session 7: reviewing the home works of the previous session, studying the procedure of relaxation, introducing the exercises outside the group by the therapist, home exercises for administration outside the group

Session 8: reviewing the home works of the previous session, assessing the anxiety of members in the outside environment, assigning home works

Session 9: reviewing the home works of the previous session, discussion about the encountered situations outside the group environment and getting feedback from other members

Session 10: reviewing the previous sessions and previous home works

Session 11: assignments for confrontation outside the group environment by the therapist and positive feedbacks provided by other members, discussion about the strategies for preventing recurrence

Session 12: taking a retest, assessing the improvement of all group members, discussion about the strategies for relapse prevention

Research instruments

a) Diagnostic interview based on ADIS-IV (anxiety disorder interview schedule for DSM-IV): Interview of anxiety disorders for DSM-IV is a structured interview which is designed for assessing the current courses of anxiety disorders. This program makes it possible to make a differential diagnosis between anxiety disorders based on the criteria of DSM-IV. Also, ADIS-IV provides sufficient information for the functional analysis of anxiety disorders. Moreover, some parts of it evaluate behavioral and drug misuse disorders, because these disorders have a high simultaneity with anxiety disorders and most of their signs are similar to that of anxiety disorders. ADIS-IV also included some sieving questions for psychotic signs, signs of change and family background of those suffering from psychological disorders. There is also a section for determining the participants' history of medical and psychological treatment.

Therefore, ADIS-IV makes it possible to use DSM-IV multi-axial systems except for axis II (19).

b) Social phobia questionnaire: Social phobia questionnaire was first proposed by Connor et al. for social phobia inventory.

Clinical implications of this questionnaire show that it offers the clinical symptoms of fear, avoidance, and physiological symptoms. This questionnaire has a high validity and reliability. Its reliability was measured through retesting in groups suffering from social phobia.

Reliability scores were 0.89 and 0.87. Internal consistency coefficient (Ella factor) was reported to be 0.94 in a normal group and 0.89, 0.91, and 0.80 for fear, avoidance, and physiological discomfort, respectively. According to the results for the interpretation of scores, the cutoff point of 40 with a diagnostic accuracy efficiency of 80% and the cutoff point of 50 with the diagnostic accuracy efficiency of 89% distinguish people suffering from social phobia from those who are not suffering from this kind of phobia.

The psychometric of this test in Iranian examples is as follows: the reliability in groups diagnosed with social phobia disorder was measured with retest method and the correlation coefficient is from 0.78 to 0.98. The internal consistency alpha coefficient in a group of normal people has been 0.96 for the whole scale and 0.89, 0.91, and 0.80 for the subscales of phobia, avoidance, and physiological discomfort, respectively (20).

c) Gary-Wilson's personality questionnaire: This scale evaluates the activity level of neuro-behavioral systems and their components. It includes 120 items. 40 items have been considered for the evaluation of each of the three systems: behavior activation system, behavior inhibition system, and fight-flight systems. Among the 40 items related to the activity of behavior inhibition system, 20 items are assigned to the potential active avoidance component and 20 items are assigned to the silence component. Among the 40 items related to the activity of behavior activation system, 20 items are assigned to the turned component and 20 items are assigned to the active avoidance component. Finally, among the 40 items related to the fight-flight system, 20 items are assigned to the fight component while 20 items are assigned to the flight component. Azad Fallah et al. reported the cronbach's alpha coefficients for turned component (0.68), active avoidance (0.65), potentially active avoidance component (0.78), silence component (0.71), fight component (0.69), and flight component (0.78) (As cited in Azad Fallah, 2001). Wilson et al. also reported the obtained alpha coefficients mostly around 0.6 to 0.7 which is an indication of the scale's acceptable internal consistency (21).

Results

Participants in this study were between 20 to 30 years old. The average age of control and experimental groups was 24 which shows that groups were in a similar age range. Females were greater in numbers. There were 7 female and 3 male participants in the control group and 6 female and 4 male participants in the experimental group. The minimum university degree of the participants was B.A and the highest degree was M.A. 4 participants in the experimental group and 2 participants in the control group were married.

Table 1 illustrates the results obtained from the descriptive analysis of the data gathered by administrating Gary-Wilson's scale of neuro-behavioral systems on the members of the 2 groups in the pretest and posttest stages.

Table 1: descriptive indices related to the variable components of neuro-behavioral systems

Standard deviation	Average		Group	Variable
4.80	40.44	pretest	experimental	Behavior activation system
43.60	60.43	posttest		
17.70	90.40	pretest	control	
57.70	70.42	posttest		
68.50	10.48	pretest	experimental	Behavior inhibition system
69.90	80.28	posttest		
93.70	42	pretest	control	
86.70	70.40	Posttest		
65.80	30.38	pretest	experimental	Fight-flight system
5.60	50.38	posttest		
84.8	50.39	pretest	control	
91.8	80.40	posttest		

According to the results of this table, among the three neuro-behavioral systems in the pretest stage, the experimental group of behavior inhibition system with the average of 48.10 and the control group of the behavior inhibition system with the average of 42 had the highest average scores. Before presenting the results of the covariance multivariate analysis, it must be mentioned that the results for checking the default homogeneity between variance and covariance were not statistically significant (P>0.05) which means that the default homogeneity of variance-covariance is established. Therefore, the Lambda Wilkes test was used for examining the significance of multivariate effects. The results of this analysis show that by controlling the effect of pretest scores, there is a significant difference between the experimental and control group in the new variable which results from the linear combination of the three neuro-behavioral systems' scores as dependant variables (Lambda Wilkes=0.54, P<0.05, $F_{(3,13)}$ =3.63).

Table 2: The results of effects between subjects for comparing neuro-behavioral systems in the experiment and control groups

Effect magnitude	Significance value	F	Average of squares	DOF	Sum of squares	Statistical index variable
2.00	57.00	33.00	30.80	1	30.80	Behavior Activation System
40.00	6.00	23.10	81.83	1	81.83	Behavior Inhibition System
0.13	0.15	2.29	88.24	1	24.88	Fight-Flight System

in order to compare the two groups regarding each of the neuro-behavioral systems, the results of the effect between subjects in table 2 shows that there is a significant difference only in the posttest scores of the behavior inhibition system (F=10.23, P<0.01) between the subjects of the experiment and control groups. By looking at the results presented in table 1, this difference is such that the subjects of control group have significantly got lower scores in the posttest stage of behavior inhibition system.

In the Connor's anxiety questionnaire, for the

Table3: Descriptive indices related to Connor's variable components of social anxiety

Standard deviation	Average		Group	Variable
4.42	15.40	pretest	experimental	Phobia
4.17	6.90	posttest		
2.21	13.70	pretest	control	
2.50	13.50	posttest		
3.97	17.40	pretest	experimental	Avoidance
3.52	7.20	posttest		
3.62	15.70	pretest	control	
3.78	13.10	posttest		
2.21	12	pretest	experimental	Physiological discomfort
3.17	4.90	posttest		
4.52	8.70	pretest	control	
4.26	9.20	posttest		

experiment group in the pretest stage the avoidance component has the highest score average (17.40) and also in the posttest stage the same component has the highest score average (7.20). For the control group, the avoidance component has the highest score average in the pretest stage (15.70) and the phobia component has the highest score average in the posttest stage

(13.50). In order to analyze the scores of Connor's social anxiety questionnaire, MANCOVA was used. For checking the default homogeneity of variance-covariance, the results of the Box test showed that this test was not statistically significant (P>0.05) which means that the default homogeneity of variance-covariance matrixes is established. Therefore, the Lambda Wilkes test was used for examining the significance of multivariate effects. The results of this analysis show that by controlling the effect of pretest scores, there is a significant difference between the experimental and control group in the new variable which results from the linear combination of the three neuro-behavioral systems' scores as dependant variables (Lambda Wilkes=0.27, P<0.001, $F_{(3,13)}$ =11.44).

Also, for comparing the two groups according to the components of Connor's social anxiety questionnaire, the results of effects between subjects presented in table 3 show that there is a significant difference between the subjects of experiment and control groups in the posttest scores of phobia (F= 32.71, P<0.001), avoidance (F= 21.15, P<0.001), and physiological discomfort (F= 27.38, P<0.001) components. By looking at the results presented in the table, this difference is such that the subjects of the experiment group in the posttest stage have significantly got lower scores in the three components of social anxiety.

Table 4: The results of effects between subjects for comparing social anxiety in the experiment and control groups

Effect magnitude	Significance value	F	Average of squares	DOF	Sum of squares	Statistical index variable
						Connor's social anxiety
0.68	0.001	32.71	268.49	1	268.49	Phobia
0.58	0.001	21.15	204.62	1	204.62	Avoidance
0.64	0.001	27.38	184.02	1	184.02	Physiological discomfort

Discussion

The current study was conducted aiming at evaluating the efficiency of cognitive-behavioral therapy based on Hofmann's model in reducing the signs and neuro-behavioral systems of patients suffering from social anxiety disorder. The results of MANCOVA test for controlling the synchronous variables showed that the experiment group, after adjusting the averages and controlling intervening variables, obtained a significant decrease in the scores of social anxiety in the three components of phobia, avoidance, and physiological discomfort and in the neuro-behavioral systems of the behavior inhibition system. In order to justify this effectiveness in the multiple dimensions considered (according to the scale), a few cases must be mentioned. In general, these findings are in line with the following studies.

In a study by Florsheim on students suffering from social phobia disorder, it was shown that teaching social skills along with assertiveness reduced the symptoms and increased the social skills of the students (18). Hayward et al. found cognitive-behavioral group therapy to be effective in curing adolescent girls suffering from social phobia disorder. They also reported that the treatment of social phobia significantly reduces the danger of MDD recurrence in people who suffered from this disorder before (23). Atrifar et al showed that cognitive-behavioral therapy is effective for treating social anxiety in the Iranian context and this effectiveness has also remained in the interval between posttest and follow-up (15). Studies conducted by Fisher and Wells, and Ross and Van Koesreld also suggest that cognitive-behavioral and meta-cognitive therapies are effective in the treatment of anxiety disorders and especially social phobia disorder (24,25). People suffering from social anxiety disorder experience unexpected and successive experiences of emotions. These successive emotional warnings make them feel that physical and emotional responses are incontrollable. Therefore, people suffering from social anxiety disorder believe in avoiding social situations because they predict the lack of internal control on emotional responses when encounter the situations causing social anxiety (24). Avoidance leads to the maintenance of social anxiety. The strong point of Hofmann's model compared to other models is its emphasis on confrontation with "self" in addition to confrontation with the situation. Recurrent confrontation breaks the vicious cycle of social anxiety and results in the effectiveness and triggering of the behavior inhibition system. Since this system has a role in anxiety states, failure to avoid triggers the behavior inhibition system and causes in going to the anxiety-causing situation. Recurrent confrontation results in reduced phobia

and discomfort which together lead to reduced anxiety in social situations. Therefore, cognitive-behavioral therapies have several components for treating the signs of social anxiety disorder which can also be effective in treating social anxiety and the performance of neuro-behavioral systems.

Limited range of educational degrees and age scope of the participants may limit the generalization of the findings to samples outside this study. The lack of a short follow-up stage is another limitation. The limited number of studies on Hofmann's model is another limitation which hinders us from checking the results comparatively. Further studies may test the effectiveness of Hofmann's model on other kinds of anxiety disorders. Comparing the cognitive-behavioral treatment based on Hofmann's model with other popular treatments is another area to be studied.

Conclusion

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