Research Article

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Evaluating the Impact of Cognitive Behavioral Therapy on Anxiety, Depression and Stigma Reduction in Patients with Substance Use Disorder: A Pre-Post Analysis Study

Hassan Mohammed Sonbol[1], Amal Al Ghailani[2]* and Mostafa Abdel-Monem Amr[3]

[1]lecturer of psychiatry, faculty of Medicine, Mansoura University, Egypt

[2]Lecturer of psychology, National University of Sciences and Technology, Oman

[3]professor of psychiatry, National University of Sciences and Technology, Previously HOD of psychiatry in Mansoura University, Oman

ABSTRACT
This longitudinal study assessed the effectiveness of Cognitive Behavioral Therapy (CBT) in addressing anxiety, depression, and stigma in patients with substance use disorder. Following a 45-day rehabilitation program and one-and-a-half-month follow-up, significant improvements were observed. Post-therapy, the median depression score decreased significantly (p < 0.001), with a remarkable reduction in very severe depression from 83.7% to 4.1%. Anxiety symptoms also showed a significant decrease (p < 0.001), with a decrease in moderate and severe anxiety from 46.9% and 20.4% to 8.2% respectively. Perceived stigma associated with substance use disorder was significantly reduced (p < 0.001) following therapy. These findings support the efficacy of CBT in reducing depression, anxiety, and perceived stigma, emphasizing its potential benefits in comprehensive treatment plans. Further research is needed to validate these results and investigate long-term effects.

*Corresponding author
Amal Al Ghailani, Lecturer of psychology, National University of Sciences and Technology, Oman.

Introduction

Lander, et al. believed that substance use disorder (SUD) is one of the most severe psychosocial traumas posing environmental, psychological, behavioral, and emotional challenges to individuals [1]. It can cause obstacles for persons, families, and cultural foundations, endangering countries' dynamics. SUD is a brain disorder that impacts the person's behavior, manifests as psychological and physiological symptoms; and persists for a long duration despite its harmful and detrimental consequences.

Volkow reported that SUD poses many risks for individuals like disturbing their social lives and interfering with their compatibility with others, also it can cause negative financial consequences which are beyond the healthcare system [2]. For instance; exiting a person from the labor market impairs economic efficiency, increasing crime rates, causing chronic health problems and/or disability, and finally, leading to death.

McHugh, et al. stated that SUD is a serious health obstacle that can be overcome. Cognitive-behavioral therapy (CBT) is one of the non-medical strategies used to manage SUD [3]. This form of therapy has been used to treat patients with SUD in various clinical studies, and its clinical efficacy has been proven.

Momeni, et al. demonstrated that the treatment of substance use disorder is a multi-dimensional process demanding specialized care and long-term efforts as SUD has high comorbidity with other psychiatric disorders, such as anxiety and depression [4]. Thus, these disorders should also be put into consideration while managing any case with SUD. For this reason, the treatment plan should meet all these 3 important targets, namely, stopping the physical consequences of dependence on drugs, decreasing the psychological consequences of drug dependency such as anxiety and depression, and ultimately preventing relapse of the disorder.

Based on the previous relevant literature, approximately ninety percent of patients with SUD suffer from mood disorders, especially depression, and anxiety, which are among SUD's most common psychiatric complications. On the other hand, major depressive disorder is highly comorbid with SUD and can be considered the second main cause of disability and social harm in the world. According to Beck's cognitive theory of depression, depression is a pathological disorder that changes the emotional, motivational, behavioral, cognitive, and physical aspects of one's life. It is one of the most prevalent psychiatric disorders with a lifetime prevalence of 15.8% [5].

Hofmann and colleagues stated that Anxiety, with a lifetime prevalence of 28.8%, is one of the most common psychiatric disorders, defined as an unpleasant feeling of irrational fear, and experienced as helplessness, and physiological arousal [6]. Preoccupation and apprehension are common features of anxiety, while depression is manifested by a deterioration in the person's willingness to be involved in any daily activity; so socialization,

recreation, eating, and having sexual desire, are deeply impacted.

Regarding the comorbidity of depression and anxiety with SUD, the three problems can be simultaneously targeted through CBT, with the results of previous studies conducted by Hollonk, et al., Momeni, et al., Jayasvasti, et al., Watkins, et al., Hamzeh Pour, Riper et al. and Toneatto and Calderwood confirm that CBT can be effective in reducing depression and anxiety [4,7-12].

Ruʼsch, et al. revealed that an analysis of pre and post-intervention evaluation of the cognitive effects of cognitive behavioral therapy on changes in perceived stigma confirmed a reduction in maladjusted cognitive biases and perceived stigma. Furthermore, the observed correlation between improved cognitive bias and improved stigma suggested that cognitive behavioral therapy was an effective intervention method for depressed and anxious patients [13]. In accordance with the social cognitive model, when persons who held stereotypes such as ''people with mental illness are socially unfit'' became affected by a psychiatric disorder, they held the self-belief ''I am a weak individual and a failure''.

Aim of the Work
The study aimed to assess anxiety, depression, and stigma among patients with substance use disorder before and after the termination of their rehabilitation program in the inpatient department of the addiction unit of Mansoura university hospital which adopts CBT techniques mainly for managing patients.

Methods
Pre-Post Analysis of CBT: Single-Group Intervention Study for Patients with Substance Use Disorder.

Inclusion Criteria
1. Male patients
2. 18 to 55 years old
3. Patients with Opioid use disorder comorbid with anxiety and depression as evidenced by SCID-I based on DSM5 criteria.
4. Admitted to the inpatient department
5. Continued the follow-up in the daycare for at least one and a half months
6. Average IQ as evidenced by the Wechsler adult intelligence scale
7. Agreeing to participate in the study

Exclusion Criteria
1. Psychiatric disorders other than anxiety and depression as evidenced by SCID-I.
2. Illiterate patients
3. Any disorder affecting the cognitive functioning.

Setting and Duration
The present study has been conducted by following up on patients with substance use disorder who have been admitted to the inpatient department of the addiction unit at Mansoura university hospital and terminated the rehabilitation program after 45 days. The researcher assessed anxiety, depression, and stigma before starting and after the termination of the rehabilitation program and following up in the daycare for at least one and half months, using the Beck anxiety, depression inventory, and perceived stigma of substance abuse scale. All of that after the agreement of the participants to share in this research. The study has been carried out from April 2023 to August 2023.

Tools of Data Collection
Structured questionnaire has been made. It had four components. Part 1 is to evaluate sociodemographic data. Beck depression and anxiety inventories, part 2, part 3, and the perceived stigma of substance abuse scale, part 4, were all included.

Beck Anxiety Inventory (BAI)
The BAI was created to evaluate anxiety symptoms separately from depression symptoms. There are 21 components in the BAI. For these 21 questions, Beck, et al. suggested a two-factor model: physical symptoms and affective-cognitive symptoms. Validation studies have been the main source of support for this concept. However, a four-factor model (neurophysiological, subjective, panic, and autonomic symptoms) and a three-factor model (somatic, subjective, and panic symptoms) have also been presented. The BAI has a strong test-retest correlation ($r = 0.67$) and excellent overall internal consistency. With correlations between 0.78 and 0.81 with the SCL-90 Anxiety Subscale, the Hamilton Anxiety Scale, and Spielberger's STAI, the BAI also has strong concurrent validity. Therefore, the BAI is a valid and trustworthy instrument for measuring anxiety symptoms, according to the existing empirical evidence.

Beck Depression Inventory
The Beck Depression Inventory is a multiple-choice assessment with 21 items. According to the degree of the manifestations throughout the previous week, which can range from the lack of a symptom to an extreme form, respondents are asked to assess each item using one of four options. The Beck Depression Inventory also comes in a 13-item format. Both the original and abbreviated variants have acceptable test-retest reliability in adult and nonpatient populations as well as reasonable internal consistency for nonpatient and depressed individuals [14].

Perceived Stigma of Substance Abuse Scale
This scale was initially created and validated in a group of patients receiving treatment for issues connected to substance use in the United States. The scale was correlated with internalized shame, self-concealment, internalized stigma, and depression in the original development and validation study. The items were adapted from Link's perceived discrimination-devaluation measures, and content validity was evaluated by review from substance use stigma experts. A four-point Likert scale is used to score each item on the scale (1 being strongly disagreed with and 4 being strongly agreed with). After reverse coding the positively phrased items, a higher score denotes a higher amount of perceived stigma.

Rehabilitation Program in the Addiction Unit of Mansoura University Hospital
The journey of recovery in the addiction unit of Mansoura university hospital is based on the CBT model for managing patients with substance use disorder, the patients came to the outpatient clinic; which runs 3 days per week and introduces its services to populations from 3 surrounding districts to Dakahylia (Damietta, Kafr el sheik, and el Gharbia), each clinic includes; consultant, specialist, resident of psychiatry, 3 psychologists and 4 nursing staff.

A urine screen test was carried out for each patient to determine the substances of abuse, interviewed by a psychologist who adopted the motivational technique for interviewing patients, then interviewed by a psychiatric resident who diagnosed substance use disorder using SCID-I according to DSM5 criteria, then referred the patient to a specialist to propose the management plan, mostly

included psychotropic medications and pain killers to manage the withdrawal symptoms during the first week of abstinence, the last step was the decision of the consultant regarding the admission of some patients in the inpatient department for one and half month if needed (6 weeks for initial rehabilitation). The capacity of the inpatient is 30 patients.

The admission was based on the severity of the cases, absence of comorbid organic disorders, motivation to be rehabilitated, and gradual stoppage of psychotropics. In the rehabilitation unit, we adopted cognitive behavioral therapy techniques, a contingency management approach, motivational enhancement therapy, and sharing in sports and gym activities. The inpatient team includes 5 psychiatrists, 5 psychologists, 8 nurses, and 4 ex-addicts. After completing the inpatient rehabilitation, the patient joined the daycare program with twice weekly follow-ups to monitor the recovery by doing urine screen tests, and CBT sessions on individual and group forms. On the other hand, we have a daycare program (one weekly follow-up) for the group of recovered non-admitted outpatients introducing the same previous psychological interventions.

We recruited 62 patients with substance use disorder, based on history and the urine screen tests; 54 patients were opioid use disorder and 4 patients were cannabinoid use disorder, 3 had methamphetamine use disorder and 1 tramadol use disorder, the last 8 patients were eliminated to ensure the consistency of the sample (opioid use disorder), 3 patients refused to complete the study, and 2 gave incomplete sheets, lastly we had 49 patients with opioid use disorder who completed the study. We conducted 12 Cognitive-Behavioral Group Therapy Sessions (one group session weekly), half of the sessions; were inpatient and the other half; in daycare, carried out by trained psychologists and psychiatrists on CBT techniques for addiction, depression, and anxiety (members of the Egyptian CBT association who trained for one and half years and have a diploma in CBT).

Cognitive-Behavioral Group Therapy Sessions
First: Members were introduced to one another and the group's rules were presented. Understanding of the cognitive-behavioral model, which describes how ideas, feelings, and behavior are related, giving definitions of stigma, depression, and anxiety; discussion of false assumptions regarding SUD. finishing the pre-tests.

Second: explaining the circumstances that cause depression and anxiety; identifying the causes of stress; describing the physical, behavioral, emotional, and cognitive symptoms of depression implementing a stress-management program based on Benson's technique; The patient was asked to choose a focus word (such as "one") in the first step. The patient was instructed to close her eyes in step two. In step three, the patient was instructed to gradually relax every muscle in their body, starting with their toes and feet and working their way up. The patient was instructed to breathe naturally and slowly in step four. And in the last step, the patient was directed to silently repeat the targeted words or phrases as she exhales, or concentrate on her breathing pattern.

Third: homework check-ups, stress-reduction techniques, and some tips for stigma:
Learn about addiction, intervene gently:"The data doesn't support [the tough love] approach."
Understanding science-based treatment, dealing with stigmatized language, remembering that relapse isn't a failure, explaining poor

self-representation and investigating of its causes and homework assignments [15].

Fourth: Checking homework, explaining periods of depression as well as anxiety, guided imagery, discussions, and exchange of ideas (cognitive restructuring regarding anxiety, depression, and stigma (Addiction is not the entirety of me. I am me; I am not just my addiction), and homework assignment

Fifth: Checking assignments, progressive relaxation of muscles, discussion of the proposed points, thought diary, thought stoppage techniques, and homework assignment

Sixth: Checking homework, discussion of the proposed points, and practicing the ABCD model of Albert Ellis (A: Activating Event (something occurs to or around someone)) B: Belief (a person's belief, whether rational or illogical, is caused by the event) Consequence (the belief leads to a consequence; rational beliefs lead to healthy consequences; irrational beliefs lead to unhealthy consequences), exercising assertiveness as well as self-esteem and self-respect, applying relaxation techniques while remembering stigmatized language, and homework assignment.

Seventh: Checking assignments, reviewing learned materials, training of coping methods, and homework assignment

Eighth: Evaluation, review of the proposed points, discussion and exchange of ideas, test administration, and improving concentration. Problem-solving skills.

Ninth: Anger management skills.

Tenth: Dealing with cognitive stimuli, and stigmatized messages.

Eleventh: Dealing with depression and anxiety.

Twelfth: Planning for the future, the conclusion of all sessions re-completing the questionnaires by the group

Study Design
Pre – post study/ single group

Sample Size Calculation
Sample size calculation was based on the difference in anxiety score after rehabilitation of addiction between experimental and control groups depending on an effect size of 0.88 retrieved from previous research [16]. Using G power program version 3.1.9.4 to calculate sample size based on effect size of 0.88, using the 2-tailed test, α error =0.05 and power = 90.0%, the total calculated sample size will be 48 cases.

N:B sample size calculation was calculated also on depresssion but sample size calculation revealed 7 cases only.
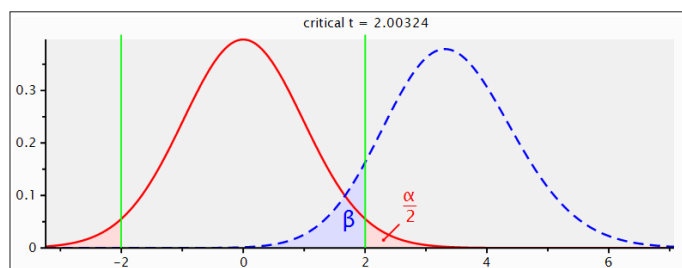
Ethical Consideration
- Study protocol was submitted for approval by IRB
- Approval of the managers of the healthcare facilities in which the study was conducted
- Informed written consent was obtained from each participant sharing in the study.
- Confidentiality and personal privacy were respected in all levels of the study. Collected data will not be used for any other purpose
- The patients were informed about their right to participate or not in the study.

Results

The present study was a pre-post study (quasi-experimental study) that was carried out on 49 cases, the mean age is 32.04 years ranging from 17 to 52 years, 100% males, 65.3% manual workers, 18.4% employee, and 16.3% not working, 55.1% single, 36.7% married, 6.1% divorced 2% widow, 73.5% middle education, 14.3% university & higher education 12.2% primary& preparatory education as shown in Table 1.

Table 1: Sociodemographic Characteristics of the Studied Cases

	N=49	%
Age/ years Mean±SD (min-max)	32.04±7.98 (17-52)	
Sex Male	49	100.0
Occupation Not working Manual worker Employee	8 32 9	16.3 65.3 18.4
Marital status Single Married Divorced Widow	27 18 3 1	55.1 36.7 6.1 2.0
Educational level Primary & preparatory education Middle education University and higher education	6 36 7	12.2 73.5 14.3

Median depression score shows a statistically significant decrease after cognitive behavioral therapy to be 1.0 ranging from 1 to 5 after and ranging from 2 to 5 pre-therapy; 83.7% of cases have very severe depression pre-cognitive therapy that becomes 4.1% very severe post-cognitive behavioral therapy with percent of improvement is 58.4%. Pre-cognitive behavioral therapy median Beck score is 2 which decreased to 1 after therapy with 46.9% and 20.4% of cases having moderate and severe anxiety before therapy decreased to 8.2% moderate anxiety after cognitive behavioral therapy. Mean PSAS shows a statistically significant decrease after cognitive, and behavioral therapy as compared to pre-cognitive therapy with a percent of change is 7.5% as shown in Table 2.

Table 2: Comparison of Depression and Anxiety Scores Pre and Post Cognitive Behavioral Therapy

	Pre- cognitive behavioral therapy	Post- cognitive behavioral therapy	Wilcoxon signed rank test /Paired t test	% of change
Depression score Median (min-max)	5.0(2.0-5.0)	1.0(1.0-5.0)	Z=5.96 P<0.001*	58.4%
No depression Mild depression Moderate Severe Very severe	0 2(4.1) 2(4.1) 4(8.2) 41(83.7)	26(53.1) 6(12.2) 12(24.5) 3(6.1) 2(4.1)		
Beck Median (min-max)	2.0(1.0-3.0)	1.0(1.0-2.0)	Z=5.13 P<0.001*	42.6%
No anxiety Moderate Severe	16(32.7) 23(46.9) 10(20.4)	45(91.8) 4(8.2) 0		
PSAS Mean ±SD	20.92±2.94	19.35±3.36	t=2.6 p=0.008*	7.5%

A statistically significant relationship is detected between depression score after treatment and educational level (p=0.013). Of the cases with very severe depression, 50% were middle education and 50% were university education. Severe depression; 66.7% middle education and 33.3% primary education. Moderate depression 33.3% are university and higher education. Of cases with mild depression is detected among 83.3% middle education & 16.7% university & higher education as shown in Table 3.

Table 3: Association between Depression Score after Treatment and Sociodemographic Characteristics of the Studied Cases

	Depression score after treatment					Test of significance
	No depression N=26(%)	Mild depression N=6(%)	Moderate N=12(%)	Severe N=3(%)	Very severe N=2(%)	
Age/ years ≤32 >32	13(50) 13(50)	5(83.3) 1(16.7)	7(58.3) 5(41.7)	3(100) 0	1(50) 1(50)	MC=4.49 P=0.343
Occupation Not working Manual worker Employee	4(15.4) 19(73.1) 3(11.5)	2(33.3) 4(66.7) 0	2(16.7) 6(50.0) 4(33.3)	0 2(66.7) 1(33.3)	0 1(50) 1(50)	MC=7.32 P=0.502
Marital status Single Married Divorced Widow	12(46.2) 12(46.2) 2(7.7) 0	5(83.3) 1(16.7) 0 0	6(50) 5(41.7) 1(8.3) 0	2(66.7) 0 0 1(33.3)	2(100) 0 0 0	MC=21.52 P=0.052
Educational level Illiterate & primary education Middle education University and higher education	1(3.8) 24(92.3) 1(3.8)	0 5(83.3) 1(16.7)	4(33.3) 4(33.3) 4(33.3)	1(33.3) 2(66.7) 0	0 1(50) 1(50)	MC=19.33 P=0.013*

MC: Monte Carlo Test, *Statistically Significant

A non-statistically significant relation is detected between anxiety score after treatment and sociodemographic characteristics of the studied cases including age, occupation, marital status, and educational level as shown in Table 4. A non-statistically significant relation is detected between PSAS score after treatment and sociodemographic characteristics of the studied cases including age, occupation, marital status, and educational level as shown in Table 5.

Table 4: Association between Depression Score after Treatment and Sociodemographic Characteristics of the Studied Cases

	Anxiety score after treatment		Test of significance
	No anxiety	Moderate anxiety	
Age/ years ≤32 >32	27(60.0) 18(40.0)	2(50.0) 2(50.0)	FET=0.152 P=1.0
Occupation Not working Manual worker Employee	48(17.8) 29(64.4) 8(17.8)	0 3(75) 1(25)	MC=0.878 P=0.645
Marital status Single Married Divorced Widow	24(53.3) 17(37.8) 3(6.7) 1(2.2)	3(75) 1(25) 0 0	MC=0.832 P=0.842
Educational level Illiterate & primary education Middle education University and higher education	6(13.3) 33(73.3) 6(13.3)	0 3(75) 1(25)	MC=0.885 P=0.643

MC: Monte Carlo Test, *Statistically Significant

Table 5: Association between Depression Score after Treatment and Sociodemographic Characteristics of the Studied Cases

	PSAS score AFTER		Test of significance
	<Median score (21) N=34	>Median score (21) N=15	
Age/ years ≤32 >32	18(52.9) 16(47.1)	11(73.3) 4(26.7)	x^2=1.79 P=0.181
Occupation Not working Manual worker Employee	7(20.6) 23(67.6) 4(11.8)	1(6.7) 9(60.0) 5(33.3)	x^2=3.96 P=0.138
Marital status Single Married Divorced Widow	18(52.9) 12(35.3) 3(8.8) 1(2.9)	9(60.0) 6(40.0) 0 0	MC=1.92 P=0.584
Educational level Illiterate & primary education Middle education University and higher education	2(5.9) 27(79.4) 5(14.7)	4(26.7) 9(60.0) 2(13.3)	MC=4.21 P=0.121

x^2= Chi-Square Test MC: Monte Carlo Test, *Statistically Significant

Discussion

The aim of this study was to evaluate the effectiveness of cognitive behavioral therapy on depression, anxiety, and stigma levels in Egyptian males with substance use disorder. The results revealed that the use of cognitive behavioral therapy caused a reduction in the levels of depression and anxiety among the participants. This was consistent with the findings of Hollon, et al., Momeni et al., Jayasvasti, et al., Watkins, et al., Riper, et al. and Hamzeh [4,7-11].

Other studies reported that cognitive behavioral therapy, whether for individuals or groups, was effective in reducing depression. Indeed, the results of the research have indicated that cognitive behavioral therapy is highly effective in ameliorating depression in the experimental group, as compared to the control group [17,18]. In contrast to our study, there was no control group.

Patients with substance use disorders may benefit from cognitive behavioral therapy because it can alter their attitudes and beliefs following sessions, boost their self-esteem, and improve their logical thinking [16]. Through the use of cognitive behavioral therapy techniques, patients with SUD learn to modify their negative ideas and internalize problem-solving, social, and assertiveness skills, which can enable them to get over their depression [19].

It should be noted that cognitive behavioral therapy is the first-line treatment for anxiety disorders and has been considered very effective in this regard with regard to lowering anxiety levels in patients with SUD [20]. In reality, cognitive behavioral therapy can assist patients in developing new neural networks and engaging in behaviors that might counteract unhelpful memories and thinking [21].

Relaxation techniques and cognitive restructuring are used in cognitive behavioral therapy. By engaging in cognitive restructuring, patients gain the ability to examine the evidence supporting their anxious ideas and then challenge them for correction [21]. Additionally, relaxation techniques lower heart rate, blood pressure, and breathing rate, which lowers anxiety levels [22]. Additionally, relaxation exercises can enhance brain function and blood flow, which in turn lowers anxiety [23].

Additionally, cognitive behavioral therapy lowers stress levels in patients by assisting them to realize that they are not alone in their struggles. Additionally, stress-reduction approaches used in cognitive behavioral therapy can lessen anxiety and tension [23]. Overall, this study's findings indicated that cognitive behavioral therapy can be successful in lowering anxiety and depression. More research is necessary, though, before drawing a firm conclusion that CBT was successful in lowering anxiety and depression.

Via cognitive restructuring, cognitive behavioral therapy helps patients view their situation objectively, reducing biased thoughts and guiding patients toward more flexible thinking. Consequently, negative beliefs regarding oneself, the world, and one's future are corrected [24]. We adopted a cognitive behavioral approach to correct the negative beliefs held by the patients, resulting in a reduction in stigma levels from pre to post-CBT.

These results were identical to those obtained in previous research [25-28]. On the other hand, Griffith, et al. in their systemic review found that there was no evidence that cognitive behavior therapy significantly reduced stigma, but the analysis was based on only two studies [29].

We also found a strong relationship between improvements in depression and anxiety and the reduction of perceived stigma, consistent with previous studies [30,31]. This result showed that depression worsened as stigma increased, suggesting that stigma is one of the key variables of depression. However, few studies have examined high levels of self-stigma and severe anxiety – a topic that our results suggest requires further investigation.

Limitations

The present study was conducted on males with SUD; it is proposed that future research be done to evaluate the effectiveness of cognitive behavioral therapy on depression and anxiety in females with SUD. The sample size of this study was small, which can threaten the generalizability of the results of the study, therefore, it is recommended that future research should include a larger sample size. No control group in the current study; certain threats to validity could be prevented by the use of a control group

such as the ability to statistically adjust for confounding variables.

The novel regarding this research was not excluding the severe cases of depression based on most guidelines, but this was based on a new wave for evaluating CBT for depression which stated that: cognitive behavioral therapy might only be effective when depression is most severe and maybe a little better than placebo [32,33]. These researchers conclude that the baseline severity has little influence on the effectiveness of cognitive behavioral therapy. They state that this is potentially in contrast to the relationship between depression severity and the efficacy of the antidepressant medication.

However, those differences previously observed are related to methodological limitations and regression toward the mean. Furukawa et al. found that cognitive behavioral therapy leads to greater symptom reduction than pill-placebo, but recently traditional meta-analysis has shown no difference between cognitive behavioral therapy and antidepressant medication when compared directly [34,35].

Conclusion
This study showed that cognitive behavioral therapy can be effective in reducing depression, anxiety, and stigma. Professionals must take these comorbidities into account during the recovery process because they can put barriers to any management plan. However, to conclude that cognitive behavioral therapy was definitely effective in reducing depression, anxiety, and stigma, more studies will be needed [36].

Declaration
The authors declare no conflicts of interest in relation to this research study. No funding was received for the conduct of this study.

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