

# Efficacy of Dialectical Behavior Therapy in Reduction of Negative Emotions in Obese Women

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## Abstract

**Objective:** Dialectical Behavior Therapy (DBT) was originally developed to treat individuals with pervasive emotion dysregulation. Then it developed its approach in other disorders such as obesity. This research aims to found out the efficacy of DBT in the reduction of negative emotions (anxiety, depression, and anger) with weight loss in obese women with different reasons for obesity.

**Method:** The population of this quasi-experimental study consisted of 56 obese women with a body mass index more than 29.9 kg/m<sup>2</sup>. Descriptive statistics were computed for demographic information and self-report questionnaire. Anger, anxiety, and depression are three subscales of feelings that were tested by the 25 items of Emotional Eating Scale that was developed by Arnow, Kenardy and Agras in 1994.

**Results:** The results demonstrated that negative emotions such as anger, anxiety, and depression, significantly ( $p\text{-value} < .001$ ) decrease in obese women by weight loss during the time. Mixed-effect modeling ANOVA repeated measurements were performed to study changes in variables over time.

**Conclusions:** The results of the present study show that DBT-skills can be effective in decreasing emotion dysregulations and Body Mass Index (BMI).

**Keywords:** BMI, DBT, Emotion Regulation, Obesity, Weight Loss.

## Introduction

Obesity is a global challenge which is defined as the excessive fat accumulation that may impair health (Nemati et al, 2021), such as diabetes, heart disease, and cancers. High demands of individuals seeking obesity treatment make researchers much attention have been directed towards improving treatment outcomes. (Cornes & Martin, 2007). We categorize obesity resources to three different groups:

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1- Biological (e.g., energy metabolism (Bouchard, Tchernof, & Tremblay, 2014)) and parents' obesity (Kim, Kim, & Hing, 2016).

2- Behavioral (e.g., the presence of eating pathology, night eating syndrome, physical activity, eating habits (Yahia et al, 2017)).

3- Emotional (e.g., stress (Michels, Sioen, Ruige & De Henauw, 2017)), anxiety, anger (Schneider et al., 2010) depressed, bored or happy (Braden, Musher-Eizenman, Watford & Emley, 2018).

Studies on the etiology and causes of obesity began more than 50 years ago (Bray, Barry & Mothon, 1970). Early results found may reflect genetics and environmental influences (Cornes, Zhu & Martin, 2007) but over the past decade, increasing attention has been paid to emotion

regulation as a potentially unifying function of diverse symptom presentations (Quoidbach, Mikolajczak & Gross, 2015) and efforts to control, suppress, or avoid unwanted internal experiences (including emotions) may actually have paradoxical effects. (Gratz & Tull, 2010)

Emotion regulation can be defined as the ability to regulate emotions and emotional responses (Gross, 1998). Hence, deficits of emotion regulation can be found in a large number of psychiatric disorders (Repetti, Taylor & Seeman, 2002) without attention to the resources of obesity such as eating disorders (Bodell et al, 2019) including binge eating (Svaldi et al, 2019) and the hallmark of emotional eating, and bulimia nervosa (Ouwens, Van Strien, Van Leeuwe & Van der Staak, 2008).

Many researchers have mainly focused on the role of negative emotions as a trigger for food consumptions, but Emotional Eating refers to the tendency to eat in response to not only negative emotions but also positives as well (Wong, 2020). Moreover, van Strien et al, (Van Strien, Engels, Van Leeuwe & Snoek, 2005) found that the relationship between negative affect and overeating was mediated by poor interoceptive awareness which is positively correlated with the use of emotional eating (Rommel et al, 2012). Some pilot studies have investigated the effect of DBT skills training on problematic eating behaviors in individuals with obesity, suggesting that skills training may reduce emotional eating (Roosen, Safer, Adler, Cebolla & Van Strien, 2012) and improve mood (de Souza, Cancian, de Castro & da Silva, 2019).

One of the negative emotions is sadness and depressed. Feeling depression is normally associated with loss of appetite and subsequent weight loss (Geiker et al, 2018). Emotional eating may be a marker of atypical depression subtype which increases appetite, elevated risk of obesity (Levitan et al, 2012) and subsequent weight gain

(Lasserre et al, 2014). Also anxiety is a reaction to reversed stress response of the HPA axis (Van Strien, 2018), or a kind of blunted HPA axis activity means blunted cortisol chronic stress (Van Strien, Roelofs & de Weerth, 2013), which may be underlying mechanism of emotion leads to emotional eating and higher food intake. On the other hands, anger is typically conceptualized as an emotional response to a frustrated attempt to achieve an attainable goal, and serves to “drive” further attempts to pursue a goal with increased vigor (Schneider et al, 2010).

The aim of this study was to determine the effect of DBT on weight loss and negative emotions in obese women with various causes of obesity such as biological, behavioral, and emotional sources that have never been worked on before. By doing so, we can better help obese people find a cost-effective way for a variety of obese reasons, both in terms of time and cost.

## Method

### Participants and Procedure

This research was a quasi-experimental study. Participants were recruited with a body mass index greater than 29.9 kg/m<sup>2</sup> from Amir al Momenin Hospital and a private clinic in Tehran during May to October 2019. Inclusion criteria were as follows: female, obese, BMI ≥ 29.9 kg/m<sup>2</sup>, age 18 to 65, no breast-feeding and no pregnancy and having a minimum literacy (high school). Other criteria were consent of participating in group therapy and research protocol, no physical disease to use special drugs such as chemotherapy, not using other psychological or pharmaceutical intervention for obesity and willing to participate in the study. Exclusive criteria were any concurrent treatment for weight, medical conditions such as uncontrolled diabetes, thyroid problems that might influence weight or eating, pregnancy, and severe psychiatric conditions as well as

being absence more than three sessions. Given a large effect size ( $f = 0.8$ ), a power of 80%, and an alpha statistic of .05, approximately 12-15 participants were needed in each group. The first screening interviews were conducted by two-member experts in the hospital for weight and height to calculated BMI. Then the second screening was conducted from eligible participants by demographic and self-reported questionnaires. Finally, 56 individuals were chosen and divided into experimental and control groups. Questionnaires repeated right after three months later after finishing intervention as well as follow up during two months later. The intervention which was adapted from The DBT Solution to Emotional Eating (Van Strien, 2018) was performed simultaneously to trial groups. Intervention included 13 group-sessions, of about 90 minutes each, one day per week. Participants were accepted into the 12 sessions of DBT training skills plus one extra session for prevention of relapse. (Table 1.)

The research was carried out under the Helsinki Declaration and approved by the ethical committee

of Hormozgan University of Medical Sciences (code: IR\_HUMS.REC.1398.344).

### Measurement

#### Body Mass Index

BMI calculations were based on dividing weight (kg) by standing height squared meters ( $m^2$ ) by trained interviewers. Weight was measured to the nearest 0.01 kg using a Zelmer electronic digital scale. Calibration of the scale was checked regularly. Height was measured with in bare feet and to the nearest millimeter using a portable stadiometer. Two independent measurements were taken for each participant, and if the measurements differed by 0.2 kg for weight or 0.5 cm for height, a third measurement was taken. The final result were averaged of two measurements of weight and height and used to calculate BMI.

#### Emotional Eating Scale (EES)

The self-report emotional eating scale has 25 items with three subscales that target feeling in the domains of Anger, Anxiety and Depression. Respondents are asked to rate the experience different type of feelings during eating, using a 5-point Likert scale. The item scores are summed form a total score between 25 and 125.

**Table 1-protocol** of DBT adapted skills training

Session	Agenda
1 <sup>st</sup>	The DBT approach to stopping binge eating (The DBT emotion regulation model)
2 <sup>nd</sup>	Making a commitment to stop binge eating- pros & cons, exploring values
3 <sup>rd</sup>	The program's goal & steps and tools to get it, diary cards, pre mindfulness skills & diaphragmatic breath
4 <sup>th</sup>	Become to be your own DBT coach, behavioral chain analysis
5 <sup>th</sup>	The benefits of DBT thinking and mindfulness, just notice and observation
6 <sup>th</sup>	Becoming a more skillful observer, nonjudgmental stance, stop being right or perfect
7 <sup>th</sup>	Staying on track, review
8 <sup>th</sup>	Mindful eating and urge surfing
9 <sup>th</sup>	Being mindful of current emotions and radically acceptance emotions
10 <sup>th</sup>	Reducing vulnerability to emotion mind and building mastery
11 <sup>th</sup>	Building positive experiences steps for increasing positive emotions
12 <sup>th</sup>	Distress tolerance & the crisis survival skills
13 <sup>th</sup>	Reviewing planning for the future, prevent relapse

The EES total score demonstrated good internal consistency ( $\alpha = 0.96$  to  $0.97$ ) (Delporte et al, 2019) and ( $\alpha = 0.81$ ), moderate test-retest reliability ( $r = 0.79$ ) (Dube, Menon, 2000).

### Statistical Analysis

Statistical analysis was performed using the IBM SPSS Statistics software package version 24.0. Research was of quasi-experimental type and was designed psychological approach. Descriptive statistics were computed for demographic information and questionnaire subscales and total scores. Mixed-effect modeling ANOVA was performed to study changes in variables over time (pre-test, post-test and follow-up). The significant level was set as  $P$  values  $\leq .05$ .

### Results

The research was conducted with 56 obese patients ranged from 19 to 64 years old. The mean of BMI was  $38.23 \text{ kg/m}^2$  ( $SD=12.67$ ), while in Pre-Test mean BMI was  $32.08$  ( $SD=1.54$ ), Post-Test  $M=29.92$  ( $SD=1.86$ ) and follow up  $M=29.13$  ( $SD=1.31$ ). Regarding marital status, 25 participants were married (44.64%), followed by those who were singles ( $n=22$ , 39.28%) and divorced ( $n=8$ , 14.29%) also 1 participant was widowed (1.79%). Most of the individuals had at least bachelor degree ( $n=18$ , 32.1%), associated ( $n=9$ , 16.1%) and diploma ( $n=13$ , 23.2%). Around 5.4% had less than diploma ( $n=3$ ) and 23.2% had completed master degree ( $n=13$ ). About 46.4% ( $n=26$ ) were employed, 37.5%

( $n=21$ ) were homemakers, and 16.1% ( $n=9$ ) were students. No client dropped out during the course of treatment. The descriptive characteristics are presented in Table 2.

**TABLE 2.** DEMOGRAPHIC CHARACTERISTICS OF INTERVENTION COMPLETERS (N=56)

	MEAN %
BODY MASS INDEX (BMI)	38.23 (12.67)
AGE	38.52
MARITAL STATUS	
SINGLE	39.28 (N=22)
MARRIED	44.64 (N=25)
DIVORCED	14.29 (N=8)
WIDOWED	1.79 (N=1)
OCCUPATION	
HOUSEWIFE	37.5 (N=21)
OCCUPIED	46.4 (N=26)
STUDENT	16.1 (N=9)
EDUCATION	
UNDER DIPLOMA	5.4 (N=3)
DIPLOMA	23.2 (N=13)
ASSOCIATED DIPLOMA	16.1 (N=9)
BACHELOR	32.1 (N=18)
MASTER	23.2 (N=13)

The means and standard deviations of research variables are presented in table 3.

The pre-assumption was DBT-skills can be effective in decreasing emotion dysregulation and indirectly on weight, emotional eating and BMI. A significant weight loss and decrease in emotional eating and BMI demonstrated right after the end of intervention according to the trajectories of the outcomes over time. Also, results at emotional situations such as anger,

**Table 3.** Raw data for each outcome, Mean, Standard Deviations/group at pre, post and 2 months follow up

measure M=SD	Pre test				Post test				Follow up			
	Biological	Behavioral	Emotional	Control	Biological	Behavioral	Emotional	Control	Biological	Behavioral	Emotional	Control
<b>BMI</b>	33.13±1.70	32.08±1.51	31.32±1.18	31.80±1.25	30.26±2.04	29.49±1.37	28.691.83±	31.26±1.17	29.542.15±	27.911.62±	27.561.75±	31.511.30±
<b>Anger</b>	19.77±2.56	27.31±2.56	40.15±2.56	34.46±2.56	17.15±1.99	22.77±1.99	25.921.99±	31.541.99±	17.772.23±	19.152.23±	25.382.23±	31.002.23±
<b>Anxiety</b>	14.69±1.79	18.61±1.79	28.85±1.79	25.46±1.79	12.85±1.47	14.69±1.47	18.851.47±	23.081.47±	13.151.54±	13.851.54±	18.921.54±	23.23±1.54
<b>Depression</b>	10.23±1.11	12.08±1.11	17.85±1.11	16.46±1.11	8.64±0.98	9.846±0.98	11.540.98±	14.230.98±	8.771.01±	8.771.01±	10.921.01±	14.921.01±

Note:  $P$ -values $<0.05$  are statistically significant, M Mean, SD Standard Deviation. Anger, Anxiety and Depression are subscales of Emotional Eating Scale (EES)



anxiety and depression, demonstrated significant decrease during the time in comparison control group according to  $P \leq .05$  and Cohen's  $d$  effect size.

Mixed model ANOVAs (repeated measures) was completed in each emotion in different groups. Results demonstrated statistically significant based on  $F$ , partial  $\eta^2$  and Cohen's  $d$ , had large effect size. Great effect size was found in emotional from pre-test to post-test as well as pre-test to follow-up. While small to medium effect size was demonstrated in post-test to follow up. Nonetheless, the data's demonstrated a slight tendency towards returning to post-test values by the two-month follow-up.

Results for the decrease of anger demonstrated statistically significant main effect of groups,  $F(3, 48) = 9.437$ ,  $p=0.000$ , partial  $\eta^2= 0.371$ , and did demonstrate a large effect size. Also statistically significant decrease has been demonstrated in anxiety by  $F(3, 48) = 10.639$ ,  $p>0.05$ , partial  $\eta^2= 0.399$  and depression by  $F(3, 48) = 8.044$ ,  $p=0.000$ , partial  $\eta^2= 0.335$ .

Moreover, the data seem to be compatible with the hypothesis that the effects of the intervention remain stable or slight tendency towards returning to baseline at 2 months follow-up. The data's are presented in table 4 and 5.

**Table 4.** Results of covariance analysis in respect to the DBT training on Emotional Eating

	DF	F	Sig	$\eta^2$
Anger	3 48	9.437	0.000	0.371
Anxiety	3 48	10.693	0.000	0.399
Depression	3 48	8.044	0.000	0.335

Note: Mean changes and effect sizes presented with positive values indicate of improvement in functioning and negative values indicative of decline in functioning.  $p$ -values $<0.001$ .

## Discussion

In the present study, our aim was to found out how DBT skills provide in reducing emotions such as depression, anxiety, and anger lead to

overeating, as well as weight loss and BMI in obese women with different causes. This study found reduced emotions dysregulation in obese patients compared to control group after DBT-adapted skill training and reduced weight and emotions such as depression, anxiety, and feeling guilty or loneliness.

The results of the present study indicate improvements in patterns of emotional eating, along with decreased problematic eating, after intervention. These improvements were sustained with slight or none tendency at follow-up. Also the results of the analysis were compatible with the hypothesis that DBT benefits in reduction of negative emotions with weight loss in obese women. Because DBT is an intervention that in addition to developing mindfulness skills, also promotes the acquisition of more effective emotion-regulation strategies (Neacsiu et al, 2014). Hence, it has been suggested that emotion regulation is a mechanism of change in acceptance-and-mindfulness-based therapies, a class of therapies to which DBT belongs (Gratz & Tull, 2010). Song and Lindquist (2015) demonstrated mindfulness effectively reduced hopelessness, depression, anxiety and stress (Lothes, Mochrie & St John, 2014).

Our findings were consistent with other studies that investigated the effects of DBT on this due. For instance, Chen et.al. (Chen et al, 2008), used DBT for clients with binge eating disorder or bulimia nervosa and found from pre to 6-months follow-up, effect sizes for binge eating were large for all outcomes. Also, Safer and Jo (2010) found that DBT reduced eating disorder symptoms, anger, anxiety and depression at one year follow-up. Moreover, Kamody, Thurston, and Burton (2020) who trained adolescence with acceptance-based on DBT skills, found increases in distress tolerance appraisal and emotion regulation scale scores from baseline to post-intervention.

**Table 5.** Effect size (d) and mean of outcomes

outcome	Group	Pre test-post test		Pre test-Follow up		Post test-Follow up	
		MD	Cohen's d	MD	Cohen's d	MD	Cohen's d
	Biological						
Anger	Behavioral	4.539	1.98	8.154	3.39	3.615	1.71
	Emotional	14.231	6.22	14.769	6.15	0.538	0.25
	Control	2.924	1.28	3.462	1.44	0.538	0.25
	Biological						
Anxiety	Behavioral	3.923	2.46	4.769	2.86	0.846	0.56
	Emotional	10	6.1	9.923	5.95	-0.077	0.05
	Control	2.385	1.46	2.231	1.34	-0.154	0.1
	Biological						
Depression	Behavioral	2.231	2.13	3.308	3.13	1.077	1.08
	Emotional	6.308	6.03	6.923	6.54	0.615	0.62
	Control	2.231	2.13	1.539	1.45	-0.692	1.32

Our findings are also consistent with the study of Kenny, Carter, and Safer (2020) who use DBT for BED offer a potentially effective means of more widely disseminating this treatment such as higher intensity approaches and less time-consuming. Mild weight loss or weight maintenance after DBT has been observed as well as decreased overeating or binge eating after dieting.

The present study relied on self-report questionnaire for all outcomes, thereby limiting the generalizability of the findings. It is true that these questionnaires are able to capture the occurrence and intensity of the behaviors of interest, not 100% actually, they still rely on the participant's responses and his or her ability to fully understand what is being asked, as well as his or her ability to accurately describe his or her own behavior in retrospect, which may be influenced by a multi factors, such as emotional states, literacy, and social desirability concerns. Also high drop-out rates at the beginning of treatment encounter us delay to start the DBT-skill trainings and repeat the questionnaires several times.

The strength of the study was that body height and weight were obtained through by objective

measurements in 100% of the participants and not self report. Since the program developed is brief, there is not any dropped out of the DBT treatment after starting intervention in the last trial. So implementation is likely a cost-effective option for various health care systems and patients. Also to our knowledge, this is the first research in the world to work on causes of obesity that evaluate the efficacy of DBT. The last but not the least, treatment has done by the translator of the book "the DBT solution for emotional eating" who mastered the content and implementation of the intervention. Overall we highly recommend to the future researchers to work on online training of DBT skills as well as in different groups of patients such as diabetes, cancers or even different ages with different emotions.

### Conclusions

In conclusion, Dialectical Behavior Therapy was proved to significantly alleviate negative emotion and relief distress from negative thoughts. Also, as an adjunctive treatment, such as obesity bariatric surgery, it is a considerable investment of both time and money for individuals affected by different obesity causes in emotion dysregulations.

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### Conflict of interest

The authors declare that there are no conflicts of interest.

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