



Research Article

EFFECT OF INTEGRATED APPROACH OF YOGA THERAPY ON IMPLICIT AND EXPLICIT DEPRESSION IN PEOPLE WITH OBESITY

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IAT- Implicit association test, Explicit, BDI-beck's depression inventory, IAYT- integrated approach of yoga therapy.

ABSTRACT

Background: Obesity and depression pose a definite problem in terms of their physical and their mental health threats at an individual level. Obese individuals are more likely to report stronger depressive symptoms. Studies have shown that yoga practices reduce depressive symptoms and improve psychological and physical wellbeing.

Objective: The aims of the study were to, (1) To study the effect of IAYT on Implicit and explicit depression in obesity. (2) To study the effect of IAYT on congruence between implicit and explicit depression in obesity.

Method: In this short-term interventional study with a pre-post design on 70 participants with obesity. Were taught integrated yoga module. It included *asanas, pranayama, relaxation, notional correction and devotional sessions*. Assessment were carried out on the 1st and 15th day of the therapy, using a Implicit association test to measure the implicit depression, BDI-II questionnaire were used with help of inquisit.3 software.

Results: Significant reduction in implicit and explicit depression ($p < 0.05$) were observed after IAYT. **Conclusion:** This study provides evidence that integrated approach of yoga therapy, a short term intensive program helps obese in Reducing depressive mood by both implicitly and explicitly.

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INTRODUCTION

Obesity and depression pose a definite problem to developing and developed regions, both in terms of their physical and their mental health threats at an individual level. Apart from physical problems associated with obesity and overweight, there are issues which affect psychological well being of an individual; and also it is being stigmatized in many ways. Depression is commonest psychological co-morbidity of obesity. It has been found that People with obesity face stigmatization and discrimination in many areas of their lives, and it has been assumed that their psychological well-being will be compromised as a result. Studies of clinical samples typically report poorer psychological well-being in treatment seekers when compared with population-based obese and normal weight controls (Wardle, Volz & Golding, 1995). Etiology and implications of obesity has been understood in sufficient details, but management skills have not progressed much. These barriers were cost of private sector services, previous patient experiences, practitioners not taking responsibilities, lack of consistency in care, limited practitioners' skills, and associated stigma (Gunther, 2012).

Making the healthier choice of foods and regular physical activity are considered to be the easiest option for treatment of obesity (WHO, 2012). Apart from this wide range of treatment options are available for the patients suffering from this ailment. Some other different options are medication, dieting, and surgical options. Each treatment option is having some or the other lacuna. Anti-obesity drugs aim to reduce food intake by either curbing appetite or suppressing the craving for food. However, many of these agents have been associated with severe psychiatric and/or cardiovascular side effects (Dietrich *et al*, 2012). Obesity and depression continue to confound modern medicine, may have a disturbing link: it is possible that treatment of one may trigger the other. So requirement of research in other modality of integrated treatment is the demand of the time. Yoga appears to be a promising intervention for depression (Kozasa, 2000) and obesity (Kristal *et al*, 2005); it is cost-effective and easy to implement. It produces many beneficial emotional, psychological and biological effects.

MATERIALS AND METHODS

The subjects for the study were obtained from Arogyadhama Holistic health center, SVYASA University. Seventy (70) subjects in the age group 18 to 60 years (Mean age=35.87 years, $SD = \pm 10.38$) were taken after screening. Subjects were in BMI range (28 kg/m² to 45 kg/m²), Single group pre-post design was applied, all subjects gave written informed consent

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before participating in the present study. The present study was approved by the ethical committee of SVYASA University, Bangalore, India. The sample size will be 52, this has been calculated by using the G-power software from the previous study (Glashouwer, & de Jong, 2010). Across recruitment setting convenient sampling was used, uniform in- and exclusion criteria were used. A general inclusion criterion was Participants who will admit for integrated yoga approach of therapy program at residential holistic health home at S-VYASA University Bangalore, Both genders, Age group 18 to 50 years (35.87± 10.38), Exclusion criteria were those with associated medical problems such as cardiac problems, uncontrolled hypertension, diabetes, osteoarthritis and on psychiatric medications, Poor eyesight or eye problems were excluded, as these participants are usually associated with depressive mood.

Intervention

The subjects in the experimental group were undergone through lifestyle change in the intervention form of integrated approach of *yoga* therapy (IAYT), which includes understanding the philosophy of *yoga* with the help of lectures, and it also incorporates *yogic* practices like *om* meditation, *asana* and *pranayama*, *yogic kriyas*, *yogic* counseling advanced techniques advanced techniques (MSRT, PET etc.) and devotional sessions, Table. 6 show the detailed interventional schedule.

Measurements

Implicit depression: implicit Association Test

The IAT is a computerized reaction time task originally designed by Greenwald (Greenwald, McGhee, & Schwartz, 1998), to measure the relative strengths of automatic associations between two contrasted target concepts and two attribute concepts. Words from all four concept categories appear in mixed order in the middle of a computer screen and participants are instructed to sort them with a left (E) or right (I) response key. The premise here is that the sorting becomes easier when a target and attribute that share the same response key are strongly associated than when they are weakly associated. The category labels are visible in the upper left and right-hand corners of the screen during the whole task (for an example see <https://implicit.harvard.edu/implicit>). Following the design of Egloff and Schmukle (Egloff, Schmukle, 2002), IAT was constructed to measure automatic self-depressive association. For the IAT the target labels were me and other. The attribute labels were depressed and elated. Each category consisted of eight stimuli. IAT consisted of two critical test blocks that were preceded by practice blocks (see Table 1). In one test block me and depressed (and other and elated) shared the same response key, whereas in the other test block me and elated (and other and depressed) shared the response key. Before the start of a new sorting task, written instructions were presented on screen. After a correct response, the next stimulus was presented after 500ms. Following an incorrect response, the symbol “x” (wrong) appeared shortly above the stimulus. Meanwhile, the stimulus remained on the screen until the correct response was given.

To obtain explicit self-beliefs of depression, participants rated a 5-point scale (1=hardly/not at all, 5=very much) (i.e., “ how much you feel, you are depressed.”).

Table 1 IAT structure

Block	No. of trials	Task	Response key assignment	
			Left Key	Right key
1	20	Target discrimination	Me	Others
2	20	Attribute discrimination	Depressed	Elated
3	20	Initial combined task (Practice)	me / depressed	other / elated
4	40	Initial combined task (Test)	me / depressed	other / elated
5	20	Reversed target discrimination	Elated	Depressed
6	20	Reverse combined task (practice)	me / elated	other / depressed
7	40	Reverse combined task (test)	me / elated	other / depressed

IAT = Implicit association test

Explicit Depression: Beck's Depression Inventory (BDI)

This is a 21-item questionnaire to assess symptoms of depression. There is much support for its reliability and predictive validity both in clinical and nonclinical populations (Kendall, Hollon, Beck, Hammen, & Ingram, 1987). Cronbach's α 0.93 in our study.

Procedure

All participants volunteered to participate in the study. The procedure and requirement for the test were explained to the participants. After informed consent the experiment was administered through computer using Inquisit 3.0 stimulus presentation software. (Inquisit, 2011) the subjects typed demographic details and took the IAT and later an explicit BDI-II questionnaire, participants were individually assessed by a clinical psychologist in a quiet room for approximately 30 mins.

Data Reduction IAT

The data were collected using computers. Inquisit stimulus presentation software was utilized for all tests including informed consent, questionnaires, and demography data sheet. IATs were administered through the stimulus presentation software, INQUISIT, version 3.0. The Inquisit program automatically generates and stores subjects' responses in a data file, with extension '.dat'. IAT scoring was done using the improved scoring algorithm (Pinter, Greenwald, 2005). For scoring the questionnaires, scoring scripts were written in R. Demographic details were extracted directly from the Inquisit output file. R statistical package(R Development Core Team, 2012) was used to analyze the data.

Data Analysis

All variables were expressed as mean \pm standard deviation. A paired wilcoxon's test was used to identify the differences in the depression levels after yoga therapy. Statistical significance was set at $p < 0.05$, and all the analyses were performed using R soft ware.

RESULTS

Implicit depression; implicit association test D_score

The baseline data were not normally distributed. Wilcoxon's signed rank test showed significant increase in implicit depression scores, which suggests that, there was significant reduction in depressive mood after Two weeks of integrated approach of yoga therapy. Table and fig. show the details.

Note: Positive D score in implicit scale means: I DO NOT consider myself as depressive; and Negative score means I consider myself as depressive. Value of Implicit D score ranges from -2 to +2; And 0 means almost no preference towards either side.

Table 2 Changes in D_scores after integrated approach of yoga therapy

Group	Mean	Sd.	% change	Effect size	P sig.
Pre	-0.02	0.45	-24.4	0.39	<0.001
Post	0.22	0.33			

Legend: There is significant increase in implicit depression scores. *p < 0.05; **p < 0.01; ***p < 0.001.

Note: a) The IAT scores scale ranges from negative to positive scores so because of that standard deviation is showing higher than mean and it is common in IAT literature.

b) We have calculated the percentage change by adding the constant number 1 for both pre and post mean.

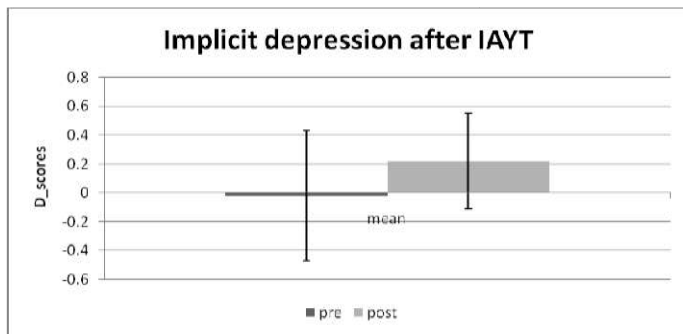


Fig 1 Changes in D_scores after integrated approach of yoga therapy as measured by IAT test

Legend: There is significant increase in implicit scores, which suggests significant reduction in depression.

Average Latency (The Time Taken To Respond For the Stimuli)

The baseline data were not normally distributed. Wilcoxon’s signed rank test showed significant reduction (P<0.001) in Average latency for the test after Two weeks of integrated approach of yoga therapy. Table and fig. show the details.

Table 3 Changes in average latency after integrated approach of yoga therapy

Group	Mean	Std. Dev.	% change	Effect size	P sig.
Pre	1831.69	800.10			
Post	925.80	539.11	49.4	1.09	<0.001

Legend: there is significant reduction in average latency scores.

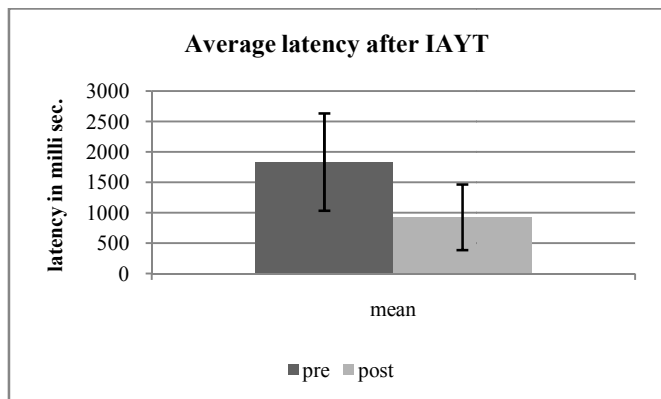


Fig 2 Changes in average latency after integrated approach of yoga therapy as measured by IAT test

Legend: There is significant reduction in average latency scores.

Mean Error Percentage (The Average Errors Performed During The Test)

The baseline data were not normally distributed. Wilcoxon’s signed rank test showed non-significant reduction in error percentage (P<0.05) after Two weeks of integrated approach of yoga therapy. Table and fig. show the details.

Table 4 Changes in mean error percentage after integrated approach of yoga therapy

Group	Mean	Std. Dev.	% change	Effect size	P sig.
Pre	20.81	12.52			
Post	17.98	10.10	13.5	0.19	0.462

Legend: there is reduction in mean error scores.

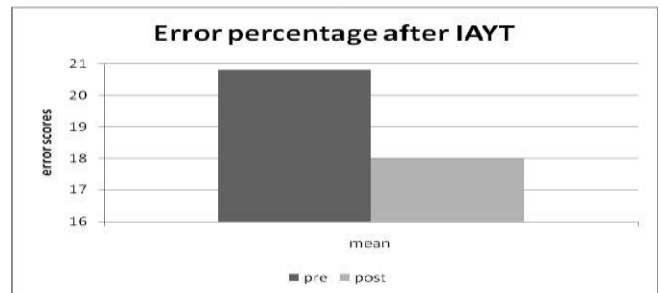


Fig 3 Changes in error percentage after integrated approach of yoga therapy as measured by IAT test

Legend: There is reduction in mean error scores.

Explicit Depression Beck Depression Inventory

The baseline data were not normally distributed. Wilcoxon’s signed rank test showed significant reduction in explicit depression (P<0.001) after Two weeks of integrated approach of yoga therapy. Table and fig. show the details.

scores: minimal— mild — moderate — severe
0 — 14 — 20 — 29 — 63

Table 5 changes in explicit depression after integrated approach of yoga therapy as measured by BDI

Group	Mean	Std. Dev.	% Change	Effect size	P sig.
Pre	24.22	9.66			
Post	4.97	5.64	79.4	1.74	<0.001

Legend: there is significant reduction in explicit depression scores.

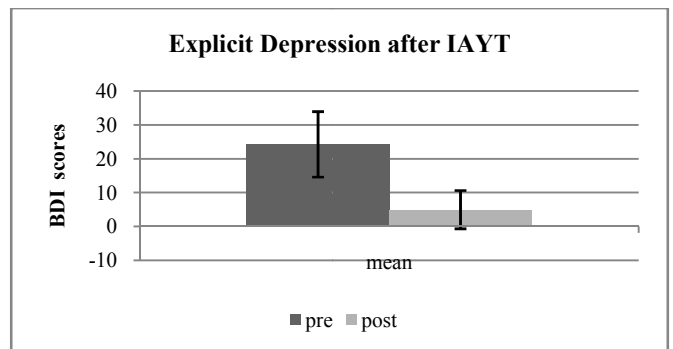


Fig 4 changes in explicit depression after integrated approach of yoga therapy as measured by BDI

Legend: There is significant reduction in explicit depression scores.

Table 6 IAYT schedule for participants:

Time	Activity
5:30AM	Om Meditation
6:00AM	Special Techniques For Obesity
7:15AM	Maitri Milan (Bhagwadgita Sloka Chanting & Satsang)
10:00AM	Lecture On Yoga Philosophy
12:00 PM	Pranayama
2:30PM	Deep Relaxation Technique
3:00PM	Cyclic Meditation
4:00OM	Special Techniques For Obesity
5:00PM	Tuning To Nature
6:15PM	Devotional Session
7:00PM	Mind Sound Resonance Technique
8:45PM	Trataka/Happy Assembly

The present study was designed as a first step in getting more insight into the relationship between depression and obesity. The results showed significant changes ($P < 0.05$) after Two weeks integrated approach of yoga therapy (IAYT) for all the variables including implicit, explicit depression, in addition to that implicit and explicit congruence was significantly increased after IAYT. The interactions between automatic self-depressive associations and explicit self-depressive beliefs did not match before. It is an important, new observation that implicit and explicit incongruence can be found in obese individuals.

DISCUSSION

Two weeks of IAYT intervention to obese patient significantly reduced their depressive mood both implicitly and explicitly. From the earlier studies it is found that yoga intervention show promise for treating low- to moderate-level depression (Shannahoff-Khalsa, 2004). A randomized control study did show a significant reduction in scores on anxiety, depression, and tension in yoga group, as well as an increase in well-being; in comparison with the control group (Raghavendra, 2009). It is found that *Yogasanas* different postures that open and lift the chest, particularly backbends, as well as standing poses and inversions improves mood (Alison *et al*, 2004), *Pranayama* (yogic breathing) found to be “antidepressant” from a randomized controlled trial (Vedamurthachar *et al.*, 2006), Low self esteem is strongly associated with depressive mood and meditation found to be beneficial in improving self esteem shown in previous study (Roth & Creaser, 1997). Furthermore, automatic self-depressive associations showed predictive validity for depression in obesity, according to recently developed information processing models (Wilson *et al.* 2000), automatic and explicit cognitions are assumed to predict different kind of behaviors. Explicit associations (beliefs) tend to predict more deliberate, controlled behaviors, whereas automatic associations are most critical for guiding relatively spontaneous behaviors (Asendorpf *et al.* 2002; Egloff & Schmukle 2002; Huijding & de Jong 2006). There is evidence that this is especially important in circumstances where there is little cognitive capacity left to deliberate about these automatic associations. cognitive capacity could also play a role in the context of depression in obesity. When cognitive capacity is limited, for example by natural ability or by other factors such as life-stress, dysfunctional automatic self-associations might obtain a stronger influence (Beevers 2005). In these cases, the automatic activation of dysfunctional self-associations could function as a repeating trigger for

repetitive negative thoughts or depressive mood, even when more positive beliefs might exist on an explicit level. In the present study the focus was on effect of IAYT on implicit and explicit depression. Therefore, it cannot be ruled out that other automatic self-associations may still be independently related to depression in obesity. Moreover, it should be acknowledged, that the present approach may have resulted in an underestimation of the importance of automatic self associations in the context of obesity. In conclusion, the present study clearly showed There was significant reduction ($P < 0.05$) in implicit and explicit measures after two weeks of IAYT. Implicit D_scores were increased after the yoga intervention which suggests there was significant reduction in depressive mood, Yoga appears to be a promising intervention for depression; it is cost-effective and easy to implement. It produces many beneficial emotional, psychological and biological effects.

Limitations and Future Directions

There are several limitations of the present study that must be considered for improving future research. Firstly, this was a single arm study with pre-post design with Short-term intervention and selection of study sample was convenient sampling that could not be a true representation of the population. The results from this study are preliminary and a pointer towards a trend. However larger cross sectional studies using random and cluster sampling strategies are needed to validate these observations in the obese population. The trends seen in these observational studies need to be confirmed using randomized controlled trials in the obese to enable recommendations for improving the psychological health by reducing the depressive mood in the obese.

CONCLUSION

We conclude that after two weeks of yoga therapy both implicit and explicit depression in obese were reduced significantly. However, there were no significant differences in error percentage between before and after yoga therapy in obese, this study provides preliminary evidence that obese are tend to be depressive and integrated yoga therapy can be an effective treatment for managing the depressive mood and incongruence in obese people. Additional trials employing objective outcome parameters need to be conducted to confirm our results and to determine the long-term effect of yoga therapy.

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Conflict of interest statement

The authors declare that they have no competing interests.

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