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Original Research Article

The Effect of Jacobson's Progressive Muscle Relaxation Technique on Depression in Diabesity Patients

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ABSTRACT

Background- The global prevalence of diabesity is alarming, this rising epidemic leads to social, clinical, economic burden and it plays an important role in depression. There is a triangle relationship between diabetes, obesity, and depression. Both diabetes and obesity increase the prevalence of depression as well as depressed patients are also prone to develop diabetes mellitus and obesity. Jacobson progressive muscle relaxation technique (JPMRT) helps in achieving deep state of mental and physical relaxation thus reducing anxiety and depression in various conditions. This is the first study conducted on diabesity patients who are at high risk of depression. The aim of this study was to determine the effect of Jacobson progressive muscle relaxation technique on depression in diabesity patients

Materials and methods- 30 diabesity patients were randomly assigned into two groups- Experimental group underwent JPMRT (n=15), for 8 weeks, 3 times a week. Control group (n=15) were under their routine oral hypoglycemic drugs. Pre and post intervention values of depression were measured using BDI-II scale.

Result – The data analysis was done using Mann-Whitney U Test to calculate BDI-II scores between the experimental and control groups and Wilcoxon Signed Ranks Test for pre and post BDI-II within group. The results have shown that there is a significant reduction in depression in experimental group compared to controls since Z value is -4.609 and its p-value 0.000 is less than 0.05.

Conclusion: Jacobson Progressive Relaxation Technique is effective in reducing depression in diabesity patients.

Keywords: Diabesity, depression, Jacobson Progressive Muscle Relaxation Technique.

INTRODUCTION

Diabesity

Diabesity is defined as a combination of type 2 diabetes and obesity in one individual, with or without risk factors such as hypercholesteremia and blood pressure. [1] Diabesity is the 21st century pandemic problem and accounts for higher economic burden, increase in morbidity and mortality of the diseases. [2] According to International Diabetes Federation (IDF) Diabetes Atlas, globally in

2017, diabetes affects 451 million and expected to be increased to 693 million by 2045 and obesity affects more than 600 million peoples. [3,4] India has 62.4 million diabetes and 199 million people with obesity. [5]

According to (IDF)-Modified ATP III criteria for South Asian population, diabesity is becoming a synonym for Indian diabetic people, greater than 70% diabetics are obese individuals. [6] There is a very strong interaction between obesity and diabetes. Asian Indians are more prone to develop diabetes with lower levels of BMI, greater central obesity (waist circumference (WC) and Waist-Hip ratio (WHR), increase in truncal, intra-abdominal visceral adipose tissue and low lean body mass causes an increase in Pro-inflammatory cytokines creating insulin secretory deficits and insulin resistance leading to type 2 diabetes. [7-8]

Depression

According to the definition of WHO, Depression is a common psychological disorder, characterized by sadness, loss of interest in activities, feelings of guilt, less self-esteem, sleep deprivation, appetite, fatigue, and poor concentration and memory. [9] Global prevalence of depression is 350 million people in all ages. [10]

The global prevalence of diabesity is alarming, this rising epidemic leads to social, clinical, economic burden and it plays an important role in neuropsychiatric diseases, especially depression. There is a triangle relationship between diabetes, obesity, and depression. Both diabetes and obesity increase the prevalence of depression, as well as depressed patients, are also prone to develop diabetes mellitus. Depressed patients have a 32-41% increase in the risk of diabetes and 8- 15% of diabetes have depression. The prevalence rate of depression is 2 times more with type 2 diabetes mellitus. There is a reciprocal relationship between obesity and depression, obesity increases the risk of depression and depression also increases the risk of 2-3 folds in the development of obesity. [11]

Pamela G. Bowen et al stated that diabesity patients have a significant increase in depression and a decrease in quality of life compared to single condition (diabetes or obesity) alone and it places an extensive economic burden. [12] Obesity and type 2 diabetes are at high risk of depression and anxiety and observed that both men and women are at risk. [13]

Depression in diabesity patients is influenced by hereditary, environmental, genetic factors. Depression and stress lead to an increase in hypercortisolemia this is the afferent hormone for hypothalamic-pituitary-adrenal (HPA) axis causes overactivation of (HPA) axis and sympathetic nervous system (SNS) resulting in higher epinephrine and norepinephrine levels, decrease serotonin levels leading to loss of muscle, increase in appetite, reduction in metabolic rate, hypertension, diabetes. Depression causes accumulation of visceral fat causes an increase in pro-inflammatory hormones like adipokines, IL-6, resistin, tumor necrotic factor causes beta cell destruction causes an increase in the risk of type 2 diabetes. These pro-inflammatory hormones are increased in obesity, diabetes and depressed individuals, further stimulate the HPA axis causes a vicious cycle. These changes will be reversed when depression is treated. [14]

Jacobson Progressive Muscle Relaxation Technique

Relaxation techniques are very useful in dealing with depression, anxiety, and stress by dealing with mind body healing. Relaxation techniques help in reducing physical and mental stresses. Most patients require training to understand how to reduce depression. Among the relaxation techniques, Jacobson's Progressive Muscle Relaxation Technique (JPMRT) is a non-pharmacological, complementary therapy, easy to learn, can be performed without assistance, less expensive, no side effects. JPMRT is discovered by Dr. Edmund Jacobson in the year 1976, explained that

purposeful contraction and relaxation of the muscle, each time the individual contracts and relaxes the muscle, they feel differences as the tension in the skeletal muscle is released creating a calming effect on mind and body. [15]

The mental health issue is often an unnoticed health issue in people suffering from diabesity. Depression is most common in diabesity patients. Thus, these mood disorders have to be screened and treated as they can hinder the individual wellbeing. [16] The directional link between depression, obesity, and diabetes will be reversed when depression is treated. PMR was proved to reduce anxiety and depression in various conditions including asthma in pregnant women, [17] pulmonary artery hypertension, [18] coronary bypass surgery patients, [19] multiple sclerosis patients, [20] nausea caused by chemotherapy, [21] There is a lack of research evidence to assess the effect of Jacobson's Progressive muscle relaxation on depression among diabesity patients. Probably this is the first study done on diabesity patients who are at high risk of depression. Therefore, this study aims to determine the effect of Jacobson Progressive Muscle Relaxation Technique on depression in diabesity patients. Research Hypothesis: The Jacobson's Progressive Muscle Relaxation Technique may be effective in reducing depression in diabesity patients.

MATERIALS AND METHODS

The study was conducted in the out-patient department of Durgabai Deshmukh College of Physiotherapy, Hyderabad after the approval of the ethical committee. Informed consent was taken from those who agreed to participate in the study; procedure and need for the study were explained in the language they understood the best. A total of 30 participants were included in this study with the following inclusion and exclusion criteria.

INCLUSION CRITERIA

40-60 years and both genders

Type 2 diabetes more than one-year with HbA1c >6.5

Obese patients with BMI >25- 34.9, waist ratio >90 for males and >80 centimetres for females, according to the World Health Organization Asia Pacific Guidelines [22]

Moderate depression of 20- 28 on beck depression inventory-II (BDI-II)

On regular medication for diabetes, never undergone JPMRT were enrolled

EXCLUSION CRITERIA

HbA1c >11%, BMI >35

Severe retinopathy, neuropathy, musculoskeletal, cerebrovascular diseases

Severe depression, On anti-depressants

30 participants with above described criteria were randomly allocated into two groups, group-A experimental group (n-15) and group B (n-15) control group respectively. Pre-values for depression were measured using BDI-II in both groups.

The BDI-II is a 21-items/symptoms questionnaire with 4 options for every question scoring from 0-3. Scores of BDI-II vary from 0-63. The severity of depression is classified as follows; No depression: 0-13, Mild: depression 14-19, Moderate depression: 20-28, Severe depression:29-63. BDI-II is the excellent validity, reliability and retest reliable tool to measure the depression. [23]

Group-A experimental group participants participated in JPMRT, 3 days a week for 8 weeks under supervision. On the first day introduction of depression and diabesity explained and they were taught how to perform JPMRT. The participants performed a progressive muscle relaxation technique for 30 minutes. Patients made to lie in a supine position on a treatment table with a quiet and comfortable environment. Patients were advised to close their eyes and slow down their breath and relax. Once they were relaxed, they were instructed to tense a muscle group for 5-7 seconds and advised to feel the contraction of muscle, after that they were instructed to relax the muscle group for 20-30 seconds approximately.

Then the subjects were taught how to relax and contract 16 muscle groups

sequence are as follows, muscles of the right-side hand and forearm, right side biceps, left -side hand and forearm, left biceps muscle, forehead, eyes, cheeks, nose, neck and throat region, chest, shoulders, back, abdomen and stomach, right side thigh, right calf, right foot, left side thigh, left calf, and left foot. After the session ended the participants were asked to open their eyes and remain in that position for a few seconds to become alert. Along with the above intervention, the group- A participants were asked to continue their routine oral hypoglycemic drugs. Group-B (control group) participants were advised to use their routine oral hypoglycemic drugs as before.

After the 8-week period of training was completed, both the group participants were asked to answer -Beck depression inventory-II questionnaire, pre and post-intervention BDI-II were analyzed and compared between the groups.

STATISTICAL ANALYSIS

The data analysis was done using SPSS software 11.5 version, Non-parametric tests were used, Mann-Whitney U Test to calculate BDI-II scores between the experimental and control groups and Wilcoxon Signed Ranks Test for pre and post BDI-II within group. Mean, standard deviation of all the values were calculated. The observed differences were tested with the Z at 95% level of significance ($p<0.05$).

RESULTS

In table 1 there is no statistical difference in age, BMI, WC and HbA1c levels in experimental and control groups. Table 2 Results shows there is a significant difference exists between Pre and Post BDI-II for depression in Experimental group, since Z value is -3.425 and its p-value 0.000 is less than 0.05. It is observed that there is no significant difference between Pre and Post BDI-II in control group as Z value is -0.882and its p-value 0.378 is greater than 0.05.

When comparing experimental versus control groups, there is no significant difference exists between Control and Experimental in PRE-values of depression using BDI-II. Since Z value is -0.317 and its p-value 0.751 is greater than 0.05.

There is statically significant difference on depression using BDI-II exists between Control and Experimental in post Intervention using JPMRT, since Z value is -4.609 and its p-value 0.0001 is less than 0.05. The results have shown that there is a significant reduction in depression using BDI II scores in experimental group compared to control group.so JPMRT is effective in reducing depression in diabesity patients.

Table 1: Age, BMI, WC, HbA1c

	Group	N	Mean	Std. Deviation	t-value	P-value
AGE	Experimental	15	49.60	4.36	-0.085	0.933
	Control	15	49.73	4.23		
BMI	Experimental	15	30.81	3.00	0.202	0.841
	Control	15	30.58	3.15		
WC	Experimental	15	96.85	7.83	-0.128	0.899
	Control	15	97.20	7.24		
HbA1c	Experimental	15	8.53	0.74	0.406	0.688
	Control	15	8.41	0.83		

There is no statistical difference in age, BMI, WC and HbA1c levels in experimental and control groups

Table 2: Comparison of pre and post BDI-II values in experimental and control groups

		N	Mean	Std. Deviation	Median	IQR	Z-value	P-value
Experimental	BDI-II pre	15	25.13	1.73	25	24 to 27	-3.425	0.001
	BDI-II post	15	19.07	1.62	19	18 to 21		
Control	BDI-II pre	15	25.47	1.64	25	24 to 27	-0.882	0.378
	BDI-II post	15	25.20	1.82	25	24 to 27		

There is a statistical difference in pre and post- values in experimental group p- value 0.001 and there is no statistical difference in control group p- value 0.378

Table 3 Comparison of BDI-II in experimental and control groups

		N	Mean	Std. Deviation	Median	IQR	Z-value	P-value
BDI-II pre	Experimental	15	25.13	1.73	25	24 to 27	-0.317	0.751
	Control	15	25.47	1.64	25	24 to 27		
BDI-II post	Experimental	15	19.07	1.62	19	18 to 21	-4.609	0.0001
	Control	15	25.20	1.82	25	24 to 27		

There is no statistical difference in pre-values in experimental versus control group p-value 0.751 and there is a statistical difference in post- values of experimental versus control group p-value 0.0001

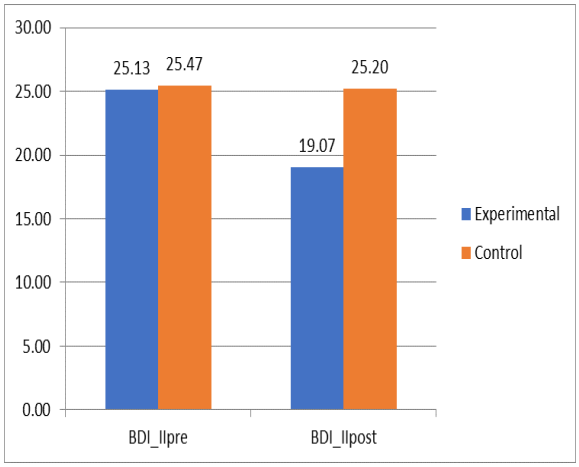

Figure1: pre and post BDI-II in experimental versus control group

This graph shows there is no difference in pre BDI-II scores in both groups and there is a reduction in post values of BDI-II with mean value of 19.07 in experimental group compared to control group mean values are 25.20.

DISCUSSION

Till our knowledge, this was the first study on diabesity patients using JPMRT to reduce depression. In this study, there is a statistical reduction in BDI-II scores for depression in the Experimental - JPMRT group compared to the control group.

Our results supported the findings of some previous studies that investigated the effect of PMR and proven effective in reducing depression in various patients including asthma in pregnant women, [17] pulmonary arterial hypertension patients, [18] coronary bypass surgery patients, [19] multiple sclerosis, [20] nausea caused by chemotherapy, [21] Polycystic ovary diseases. [24] Sabah M. Ebrahem et al 2016 found that PMR helps in reducing depression, anxiety levels, stress, quality of life, and blood glucose levels in type 2 diabetes patients. [25] Charalambous et al. (2015) concluded that Progressive Muscle Relaxation helps in reducing anxiety and depression in breast and prostate cancer patients undergoing chemotherapy. [26] According to Tejal C Nalawada, 2016 Jacobson progressive relaxation technique will improve the quality of life, reduces depression, stress, muscle tension in older adults. [27] Carol N.S et al in a systematic review suggest that PMR is easy to apply and cost-effective treatment and proves that there is an immediate effect to reduce depression in young adults. [28] Cochrane reviews have shown that relaxation techniques are effective in reducing depression when compared to the non-treatment group. [29] World Health Organization recommends relaxation training including PMR helps in reducing moderate to severe levels of depression and recognize as an adjunct to antidepressants. [30]

The possible mechanism to reduce depression may be due to psychological and physical pathways. Relaxation can enhance the production of endorphins, it has antidepressant and analgesic effects, relaxation causes a deep state of emotional, physical, spiritual stability and calmness. This helps the people to reduce irritation, insecurity feeling, and rigidity of musculature. [28]

Psychological distress especially depression leads to an increase in sympathetic nervous system activity and overactivation of the Hypothalamic-pituitary-adrenal axis (HPA) results in increased levels cortisol and catecholamines levels that decrease insulin sensitivity and increases insulin resistance causing diabetes and obesity. [31]

Corinne Urech et al 2010 found that immediate effect of progressive muscle relaxation causes a significant reduction in HPA axis and Sympathetic nervous system by decreasing salivary cortisol and norepinephrine levels. PMR helps in the activation of the parasympathetic system helps in relaxation in pregnant women. [32] According to Jacobson [33] complete muscle relaxation is due to alteration of muscle tension and relaxation results in the reduction of hypothalamic discharge which leads to activation of the parasympathetic system which causes a decrease in heart rate, blood pressure, muscle tone. Liza (2011) reports that PMR reduces stress response which helps in deactivation HPA. [34]

Regular PMR practice can control the metabolism, reduces blood glucose levels, decrease in catecholamines thus causing a reduction in activation of autonomic nervous system causes mental and physical relaxation. [35]

This study provides the first evidence suggesting that 8 weeks of JPMRT on depression in diabesity patients. There is a significant reduction in BDI- II scores. This study suggests JPMRT leads to significant reduction in depression in diabesity patients, therefore JPMRT could be used as an important therapy for diabesity patients for reducing depression.

There are a few limitations to this study. (1) The study population was limited to moderately depressed diabesity patients. 2) small sample size 3) No follow was done. Further recommendations are larger sample size, longer duration of treatment for strong evidence and to check the effectiveness of JPMRT in different severity levels of depression.

CONCLUSION

This study provides the first evidence suggesting that 8 weeks of Jacobson Progressive Relaxation Technique is effective in reducing depression in diabesity patients, therefore Jacobson Progressive Relaxation Technique can be implemented in diabesity patients.

Conflict of interest: No conflict of interest by Authors.

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