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Effect of varied level of stress on body composition for diabetic patients

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Abstract

Aims: The aim of present investigation was to study the effect of varied level of stress on body composition for Diabetic patients.

Materials and Methods: Thirty-nine Diabetes patients from the age group of 40 to 50 were randomly selected for the study. Stress levels were recorded by perceived stress scale questionnaire and Body Composition was calculated test using Body Mass Index. The collected data were statistically analyzed with suitable statistical techniques. In the results of the study stress do not have its impact of Body Composition in Diabetic.

Results: Diabetics had higher perceived stress score, medium score and lower score than diabetics. Body mass index in diabetics was slightly reduced than diabetic group and was higher in males compared to females diabetic males and females with more than 10 years duration had significantly higher score for perceived stress and poor MMSE (<23). MMSE and age were negatively correlated.

Conclusions: Diabetes leads to subtle decline in Body composition associated with high level of stress in the initial stages which may become profound as the disease progresses. Hence, it is important to screen all diabetic patients for stress level and decline in Body composition by simple bedside tests at baseline and at regular follow-up and counsel them to cope up with disease and also develops interventions such as lifestyle modification to prevent further progression.

Keywords: Diabetes, perceived stress, body composition, body mass index

Introduction

Diabetes is a serious and widespread non-communicable disease that affects millions of people worldwide, and its prevalence is on the rise. According to the International Diabetes Federation, there are approximately 415 million people worldwide living with diabetes. India has the second-highest number of diabetics in the world, with around 69 million patients. People with diabetes have a higher risk of premature mortality and disability due to the development of various complications and comorbid conditions, including obesity, coronary heart disease, arthritis, and stroke, which ultimately affect their quality of life.

Diabetes can also lead to mental and physical slowing, and cognitive decline has been identified even in the early stages of diabetes. Body composition, which is a simple marker for body mass index and height/weight, is an important risk factor for mortality in patients with diabetes. Diabetic patients are more prone to developing mental health disorders like psychological stress, which often goes unnoticed. Perceived stress is an essential predictor of diabetes, independent of other factors such as socioeconomic status and BMI. Stress can lead to poor glycemic control, which can lead to the development of more complications, further deterioration of health, more psychological stress, and health-related behavioral changes.

Stress is a common occurrence in modern-day life and can have a significant impact on an individual's overall well-being. The relationship between stress and diabetes has been studied extensively, and evidence suggests that stress can worsen diabetes symptoms. The human body is a complex system that responds to stress differently. When an individual experiences stress, the body's natural response is to release cortisol, a hormone that helps the body respond to stress. In the short term, cortisol can be beneficial, as it helps the body mobilize energy and respond to the stressor. However, prolonged exposure to cortisol can have negative effects on the body, including weight gain and an increased risk of diabetes.

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Recent research has focused on the relationship between stress and body composition in diabetic patients. Body composition refers to the proportion of fat, muscle, and bone in the body. Changes in body composition can have significant implications for health, as excessive body fat can increase the risk of diabetes and other chronic diseases. Studies have shown that stress can lead to changes in body composition in diabetic patients, including increased abdominal fat and muscle loss, both of which can worsen diabetes symptoms.

It is important to understand the relationship between stress and body composition in diabetic patients as healthcare professionals and individuals with diabetes alike. By identifying the factors that contribute to changes in body composition, healthcare professionals can develop targeted interventions to help patients manage their diabetes and reduce their risk of developing related health complications. Stress can have a significant impact on body composition in diabetic patients, with chronic stress being linked to increased abdominal fat and muscle loss, both of which can worsen diabetes symptoms. It is important for healthcare professionals and individuals with diabetes to be aware of this relationship and take steps to manage stress and maintain a healthy body composition. Detecting and addressing these complications early is crucial to prevent further progression and improve the quality of life for diabetic patients, especially since the majority of diabetic patients are between the ages of 40 and 50 years. Simple bedside tests can be used to detect these complications early, and interventions can be implemented at the earliest to prevent further progression. To better understand the relationship between stress and body composition in diabetics, a study was conducted to assess and compare body composition and perceived stress in diabetics and normal controls.

Materials and Methods

Thirty nine Diabetes patients and 40 to 50 age- and sex-matched controls were randomly selected for the study after the approval from two different hospital Kovai Kumaran Hospital Pvt Ltd, Cowley Brown Road, R.S. Puram, and Arunachala diabetic center Cowley Brown Road, R.S. Puram, Coimbatore, Tamil Nadu. This hospital receives the high number of patients for medical services especially diabetic patients. Stress levels were recorded by perceived stress scale questionnaire and Body composition test using Body mass

index. The collected data were statistically analyzed with suitable statistical techniques. Descriptive statistics such as mean and standard deviation were calculated. One way analysis of variance (ANOVA) was used to find out the significant difference between two variables. And post scheffe's post hoc test was used to find out the compare the variable between the groups. And statistically analysis were interpreted and results and findings were present properly.

Statistical technique

The purpose of present study was to find out the Effect of varied level of stress on Body composition for Diabetic patients. The collected data were statistically analyzed with suitable statistical techniques. Descriptive statistics such as mean and standard deviation were calculated. One way analysis of variance (ANOVA) was used to find out the significant difference between two variables. And post scheffe's post hoc test was used to find out the compare the variable between the groups. And statistically analysis were interpreted and results and findings were present properly. To test the obtained results on variables, the level of significance 0.05 was chosen and considered as sufficient for the present study.

Table 1: Variable and test items

S. No	Variables	Test
1	Stress	Perceived stress (Questioner)
2	Body Composition	Body mass index (Weight/Height m ²)

Result

Table 2: Descriptive statistics on Body Mass Index among varied level of stress

Variable	Category	Mean	Standard deviation
Body composition (BMI)	High level	28.47	6.73
	Medium level	29.56	7.11
	Low level	25.19	3.06

Table 2 Indicates the descriptive analysis on Body composition of the Diabetic patients. The mean and standard deviation of Body composition in high level are (28.47, 6.73), Body composition in medium level are (29.56, 7.11) and Body composition in low level are (25.19, 3.06) respectively.

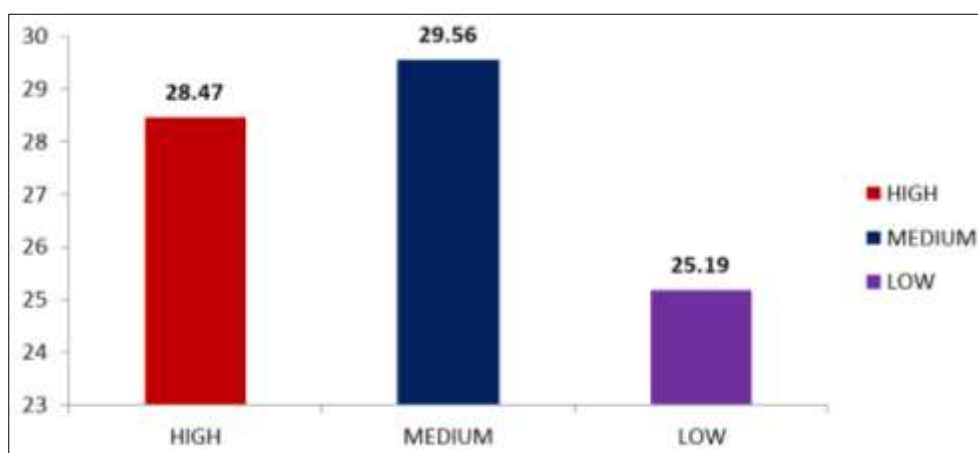


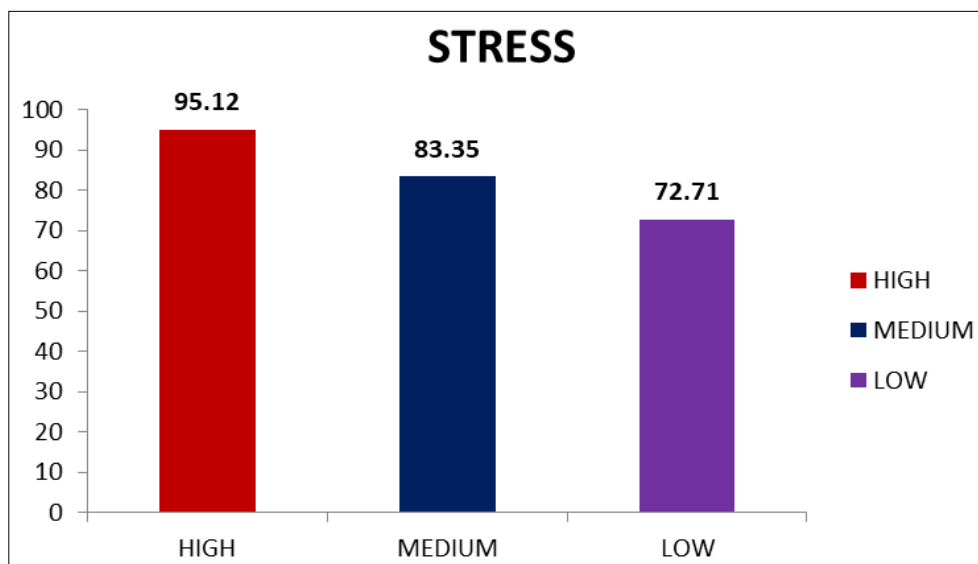
Fig 1: Bar diagram showing the mean difference diabetic patient on Body mass index

Table 3: Analysis of post hoc result over the multiple comparisons on stress among the Diabetic Patient

Variable	High	Medium	Low	Mean Deference	Sig
Stress	95.12	83.35		11.77*	0.00
	95.12		72.71	22.41*	0.00
		83.35	72.71	10.63*	0.00

*Significant at 0.05 Level

Table 4.6 reveals the results of pair wise comparison on stress between the samples varied from high and medium (11.77), High and low (22.41), medium and low (10.63). From the results is it was observed that significant mean difference was found in between the sample of high and medium (11.77), high and low (22.41), and medium and high (10.63). Mean difference on stress between the high and medium, high and low found to the significant.

**Fig 2:** Bar diagram showing the Analysis of post hoc result over the multiple comparisons on stress among the Diastolic Blood Pressure

Discussion

Diabetic is one of the cause for all other deadly diseases. The number of diabetes cases are increasing day by day. It not only affect the elder people, in recent years large number of children and adolescents are prone to diabetes and it may increase in future years, was predicted by many researchers. India is also home to the second largest number diabetes in the world with the rising trajectory of more effective health policies have to implemented to control the rapid growth of the diabetes cases. Diabetes is multidimensional in the cause like it may be due to environmental, lifestyle, clinical and genetic factors. Early detection is an important strategy to prevent and control diabetes. When captivating the diabetes cases who are suffering for long period, the control of the disease is constant, they are many reaction behind it like improper exercise, irregular medication, and prone life style, physical, physiological and psychological as well. Among all the factors, this study focused on the effect of varied level of Stress and its impact on Body Mass Index for diabetic patients. It often the precursor the diabetes Patients with BMI. BMI serve as both risk factor as well as the cause for diabetes. Body mass index helps to keep metabolic abnormality in check as a mean of secondary prevention and keep life threatening event minimum by awareness and in case of diabetic it will minimizes the complication of other diseases. Higher in BMI is believed to account for 80-85% of the risk of developing various health issues and it may be one of the factor for Diabetes. And many research believed to account for 80-85% of the risk of developing type 2 diabetes, while recent research suggests that obese people are up to 80 times more likely to develop type 2 diabetes than those with a BMI of less than 22. BMI is also associated with stress. Researchers found that individuals who had persistently high levels of the "stress hormone" cortisol over long periods of time weighed more, had a higher body mass index (BMI), and a larger

waist, compared with those who had low levels of the hormone. Considering this relationship in this study, the scholar analyzed the impact of varied level of stress on BMI, there was no significant relation for the diabetic patients in Body Mass Index because some studies supports that Body Mass Index cannot accurately dustings between Muscle Mass and Fat Mass of Body Composition of diabetes patients. So it is suggested that, in further studies the Body Composition have to be measured using scientific tests so it may give the accurate association.

Perceived Stress and Diabetes

Perceived stress was higher in diabetics compared to control group. Similar results were reported by Sendhilkumar *et al.* where high level of stress in diabetics was associated with low physical activity. Self-perceived stress has been an important predictor of diabetes independent of other factors such as socioeconomic status and BMI. Reasons for high stress in diabetes were attributed to their concerns about the long-term complications and self-management of the disease. Steptoe *et al.* reported that diabetic patients of age group 40–50 years showed poor post-stress recovery in blood pressure and heart rate and blunted stress reactivity when compared to High, Medium and Low matched with age and sex. It was also noted that diabetics experienced greater stress and also depressive and hostile symptoms more than did the healthy controls concluding that there could be dysfunctioning of biological stress-related processes or systems. Stress and related processes are known to be the contributing factors in the progression of diabetes. In our study, we found that diabetics with greater duration (>10 years) and recently diagnosed diabetics (<5 years) had high level of stress when compared to diabetics with 5–10 years duration. A study conducted in Malaysia by Kaur *et al.* revealed that stress, anxiety, and depression were more in diabetics with <2 years duration due

to their inefficiency in coping with the management of diabetes. Almawi *et al.* showed positive correlation between duration of diabetes and depression and stress.

Body Mass Index and Diabetes

In our study, Body Mass Index was slightly reduced in diabetics. Li *et al.* reported reduced muscle strength and muscle mass as a predictor of diabetes. Reduction in Body Mass Index may affect their routine activities in the long run. Although Body mass index was slightly reduced only in dominant height and weight, we did not find any differences between High, Low and Medium level of Body composition. Body Mass Index in our study was greater in High, Medium and low groups. Height and Weight is dependent on various factors such as gender and BMI. Older studies have recorded accelerated loss of muscle mass and strength in diabetics and it is greater with longer duration of diabetes. Strength of this study is that we used simple, easy, less time-consuming bedside tests to screen diabetics for stress levels, cognitive decline, and Body Mass Index. However, few limitations of this study are that only a limited number of subjects were involved in this study, their glycemic status was not known at the time of study and no follow-up was done to note down further changes.

Conclusions

In India, diabetes is a major non-communicable disease that primarily affects individuals over 40 years of age. Despite the findings of this study indicating a slight reduction in Body Composition linked to high, medium, and low levels of stress in diabetes patients, it is crucial that we detect these changes early on through simple bedside tests and raise public awareness about them. Moreover, interventions such as lifestyle modifications should be implemented to prevent the progression of the disease.

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