SHORT COMMUNICATION

ASSOCIATION OF DURATION OF ILLNESS AND COMPLIANCE WITH STRESS LEVELS IN TYPE 2 DIABETES MELLITUS PATIENTS – A PILOT STUDY

Background: Type 2 diabetes mellitus (DM) is primarily due to lifestyle factors and genetics. Physical and psychological stresses contribute to the development of hyperglycemia in the setting of type 2 DM.
Aims & Objective: To study the association of duration of illness and compliance with stress levels in patients with type 2 DM.
Materials and Methods: This pilot study was carried out at Dhanalakshmi Srinivasan Medical College and Hospital, Perambalur, Tamil Nadu on 10 patients (5 men and 5 women) with type 2 DM. After obtaining informed, written consent from the patients, we recorded body mass index, Perceived Stress Scale (PSS) score, and glycated hemoglobin (HbA1C) levels.
Results: Statistical analysis was done using Pearson's correlation, which showed a significant correlation between HbA1C levels and PSS scores ($P = 0.001$) and a nonsignificant ($P = 0.85$) correlation between duration of DM and PSS scores.
Conclusion: Results of this study indicate that stress not only contributes to the development of lifestyle disorders such as DM but also significantly affects the management and compliance.
Key Words: Compliance; Stress; Type 2 Diabetes Mellitus

Dinesh Thangavel, Vijaiananth Pitchaipillai

Dhanalakshmi Srinivasan Medical College and Hospital, Siruvachur, Perambalur, Tamil Nadu, India

Correspondence to: Dinesh Thangavel (sclerombbs@yahoo.co.in)

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INTRODUCTION

According to *Diabetes Atlas* published by the International Diabetes Federation (IDF), there were an estimated 40 million persons with diabetes mellitus (DM) in India in 2007, and this number is predicted to rise to almost 70 million by 2025.[1] Also according to the IDF, every fifth person with DM will be from India.[2] Type 2 DM (also known as noninsulin-dependent diabetes mellitus or adult-onset diabetes) is a metabolic disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency.[3]

Stress has long been shown to have major effects on metabolic activity. It stimulates the release of various hormones that result in elevated blood glucose levels. Although this is of adaptive importance in a healthy organism, in patients with DM, as a result of the impaired insulin levels, stress-induced increases in glucose levels cannot be metabolized properly.

The Perceived Stress Scale (PSS) was developed by Sheldon Cohen and his colleagues and published in 1983.[5] It has become one of the most widely used psychological instruments for measuring nonspecific perceived stress. The PSS questionnaire was developed to measure the degree to which situations in one's life are appraised as stressful.[3] It has been used in studies assessing the effectiveness of stress-reducing interventions and the extent to which there are associations between psychological stress and psychiatric and physical disorders.

Glycated hemoglobin (HbA1C) is a form of hemoglobin that is measured primarily to identify the average plasma glucose concentration over the period of few months.[6] The IDF and American College of Endocrinology recommend HbA1C values below (6.5%). In DM, increases in values of HbA1C indicate poorer control of blood glucose levels.[7] Thus, this study was aimed to observe the association of duration of illness and compliance with stress levels in patients with type 2 DM.

MATERIALS AND METHODS

This pilot study was carried out on 10 OPD patients (5 men and 5 women) of Dhanalakshmi Srinivasan Medical College and Hospital, Perambalur, Tamil Nadu, suffering from type 2 DM. The average age of the volunteers was 54.80 ± 9.69 years (mean ± SD). The purpose of the study, procedures, and benefits were explained to them in detail. The willing participants who have been diagnosed with type 2 DM were recruited for the study by getting informed written consent. Subjects receiving medication for any other chronic ailment, patients with known cardiac problems or hypertension, smokers, and alcoholics were excluded from the study.

Parameters: Body mass index (BMI) was calculated as weight (kg) divided by height (m^2). Perceived Stress Scale (PSS), a 10-item analysis questionnaire, was used to assess the stress levels. HbA1C levels were analyzed using high-performance liquid chromatography (HPLC) method with 2 ml venous blood sample for assessing the compliance.

Ethics: The study was carried out after obtaining approval from the Institute Ethics Committee for Human Studies and carried less than minimal risks.

Statistical Analysis: Data for all parameters were collected per the study protocol and entered in Microsoft Excel database. Pearson's correlation was used to study the association between the variables. All statistical analyses were done at 5% level of significance, and $P < 0.05$ was considered to be statistically significant.

RESULTS

The average age of the volunteers was 54.80 ± 9.69 years. Table 1 shows the baseline characteristics of the study participants, such as age, BMI, duration of DM, HbA1C levels, and PSS scores. Table 2 shows the association between duration of DM, HbA1C levels, and BMI with PSS scores of the study participants. The table shows a statistically significant correlation between HbA1C levels and PSS scores ($P = 0.001$) and statistically non-significant ($P = 0.85$) correlation between duration of DM and PSS scores.

Data were analyzed using Pearson's correlation. The results show a statistically significant correlation between HbA1C levels and PSS scores ($P = 0.001$) and a statistically non-significant ($P = 0.85$) correlation between duration of DM and PSS scores.

Table-1: Baseline Characteristics of the Study Participants

Parameters	Mean ± Standard Deviation
Age (years)	54.80 ± 9.69
BMI (kg/m^2)	28.36 ± 5.92
Duration of DM (years)	6.80 ± 3.91
HbA1C (%)	7.69 ± 1.03
PSS score	22.6 ± 2.41

Table-2: Association between Duration of Illness, HbA1C Levels, and BMI with PSS Scores of the Study Participants

Paired Sample	Pearson's Correlation Coefficient	Two-Tailed Significance
Duration of DM and PSS score	–0.07	0.851
HbA1C levels and PSS score	0.89**	0.001
BMI and PSS score	0.41	0.234

** Correlation is significant at 0.01 level.

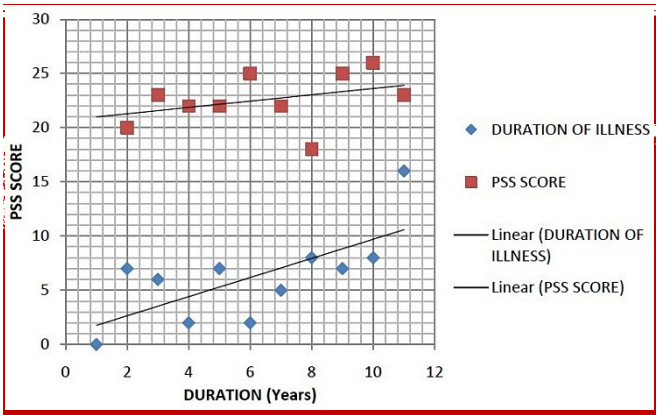

Figure-1: Association between Duration of DM with PSS Scores

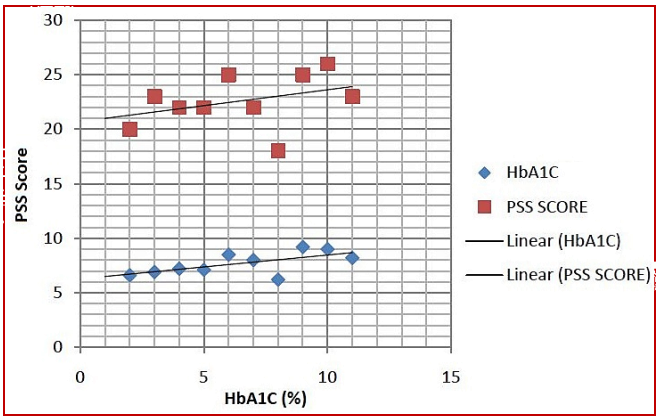

Figure-2: Association between HbA1C Levels with PSS Scores

DISCUSSION

Type 2 DM is typically a metabolic disorder associated with a 10-year-shorter life expectancy.[8] Various lifestyle factors, including obesity (defined by BMI ≥ 30), lack of physical activity, junk food, stress, and urbanization, are known to be associated with the development of type 2 DM.[9]

Stress is a potential contributor to chronic hyperglycemia in DM. Although Thomas Willis showed hyperglycemia in response to stress as early as the seventeenth century, results from previous studies are not consistent. But when the data are evaluated in the setting of a large meta-analysis, the evidence indicates that alleviation of stress leads to a modest reduction in hyperglycemia.[10]

PSS scores around 13 are considered as average. Scores of 20 or higher are considered as high stress, and those in this range need to consider stress reduction techniques. High psychological stress is associated with high blood pressure, higher BMI, larger waist-to-hip ratio, shorter telomere length, higher cortisol levels, suppressed immune function, decreased sleep, and increased alcohol consumption. These are all important risk factors for cardiovascular diseases.[11] HbA1C test is recommended

for both checking the blood sugar control in people and monitoring blood sugar control in patients with DM, thus indicating compliance with stress levels.[12] The American Diabetes Association guidelines are similar to others in advising that the HbA1C test should be performed at least two times a year in patients with DM who have stable glycemic control and quarterly in patients with DM whose therapy are not meeting glycemic goals.[13]

CONCLUSION

We conclude that the results of this study conducted on 10 patients with type 2 DM indicate that stress not only contributes to the development of lifestyle disorders such as DM but also significantly affects the management and compliance. The authors wish to extend the study further with hundreds of participants and as a multicenter study.

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REFERENCES

1. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care 2004; 27(5): 1047–53.
2. World Health Organization. Diabetes: fact sheet number 312. [updated 2013 October 13]. Available from: http://www.who.int/mediacentre/factsheets/fs312/en/index.html.
3. Kumar V, Fausto N, Abbas AK, Cotran RS, Robbins SL. Robbins and Cotran Pathologic Basis of Disease, 7th edn. Philadelphia, PA: Saunders, 2005. pp. 1194–95.
4. Leon KA, Hyre AD, Ompad D, DeSalvo KB, Muntner P. Perceived stress among a workforce 6 months following hurricane Katrina. Soc Psychiatry Psychiatr Epidemiol 2007; 42(12): 1005–11.
5. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav 1983; 24(4): 385–96.
6. Larsen ML, Hørder M, Mogensen EF. Effect of long-term monitoring of glycosylated hemoglobin levels in insulin-dependent diabetes mellitus. N Engl J Med 1990; 323(15): 1021–25.
7. Koenig RJ, Peterson CM, Jones RL, Saudek C, Lehrman M, Cerami A. Correlation of glucose regulation and hemoglobin A1C in diabetes mellitus. N Engl J Med 1976; 295(8): 417–20.
8. Melmed S, Polonsky KS, Larsen PR, Kronenberg HM (Eds.). Williams Textbook of Endocrinology, 12th edn. Philadelphia, PA: Elsevier/Saunders. pp. 1371–435.
9. Abdullah A, Peeters A, de Courten M, Stoelwinder J. The magnitude of association between overweight and obesity and the risk of diabetes: a meta-analysis of prospective cohort studies. Diabetes Res Clin Pract 2010; 89(3): 309–19.
10. Gardner DG, Dolores S (Eds.). Greenspan's Basic & Clinical Endocrinology, Chapter 17, 9th edn. New York: McGraw-Hill, 2011. pp. 573–656.
11. Risérus U, Willet W, Hu FB. Dietary fats and prevention of type 2 diabetes. Prog Lipid Res 2009; 48(1): 44–51.
12. Huang ES, Brown SE, Ewigman BG, Foley EC, Meltzer DO. Patient perceptions of quality of life with diabetes-related complications and treatments. Diabetes Care 2007; 30(10): 2478–83.
13. American Diabetes Association. Executive summary: standards of medical care in diabetes—2009. Diabetes Care 2009; 32(Suppl 1): S6–12.

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