

Effect of Proper Lifestyle Modifications on the Management of Type 2 Diabetes Mellitus

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Abstract

Introduction: Diabetes mellitus (DM) comprises a group of metabolic disorders that share the common feature of hyperglycemia. It is closely linked to change in lifestyle such as decreased physical activity, a change in diet to the one of high-fat, high-energy intake, and rapid modernization into a western society. Patients with DM can be managed by lifestyle modifications in the form of diet, physical activity, and psychological assessment with care along with drugs.

In this, we studied the effects of comprehensive lifestyle modifications and their effect on glycemic control, blood pressure, lipid profile, body weight, and 24 h urinary protein for the management of DM.

Material and Methods: This study was performed between November 2015 and May 2016 at Indira Gandhi Institute of Medical Sciences, Patna. Lifestyle modification included diet instruction, exercise, weight reduction programs, and de-stressing session. Body weight, glycated hemoglobin (HbA1C), serum triglyceride, serum low-density lipoprotein (LDL), blood pressure, and 24 h urinary proteins were measured at baseline and after 6 months of lifestyle modification program.

Results: The results of lifestyle modification after 6 months of lifestyle modification were favorable with a mean reduction in HbA1C, LDL cholesterol, triglycerides, systolic blood pressure, diastolic blood pressure, and 24 h urinary protein are 0.09, 3.32, 16.88, 00.64, 3.68, 2.04, and -232.04, respectively.

Conclusion: Comprehensive lifestyle management is an important aspect of diabetes management.

Key words: Diabetes mellitus, Lifestyle modification, Treatment of diabetes mellitus

INTRODUCTION

Diabetes mellitus (DM) comprises a group of metabolic disorders that share the common feature of hyperglycemia. Type 2 DM is common and accounting 85% of diabetes in worldwide.^[1] It is closely linked to industrialization, affluence, and increased life expectancy. India is rapidly

changing into the diabetic capital of the world. The number of diabetic people in India will increase to 57.2 million in 2025. The prevalence of diabetes in rural India is low unlike the prevalence in an urban area. The reason for this is a change in lifestyle such as decreased physical activity, a change in diet to the one of high-fat, high-energy intake, and rapid modernization into a western society. Patients with DM can be managed by lifestyle modifications in the form of diet, physical activity, and psychological assessment with care along with drugs.

This study is intended to know the effect of lifestyle modification such as dietary advice, exercise, and de-stressing session with yoga and weight reduction in diabetes management.

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MATERIALS AND METHODS

Design

This study used a single-group experimental design with a proper assignment with repeated measures.

Subject

A total of 50 patients were recruited in the study from outdoor of General Medicine Department of Indira Gandhi Institute of Medical Sciences, Patna. All patients in this study were suffering from DM type 2. Key inclusion and exclusion criteria are shown in Table 1. Written informed consent was obtained from the patients. They were screened properly and recruited for the study. Patients with advanced complications such as severe cardiovascular comorbidities, renal failure, and retinopathy were excluded from the study. Patients from both sexes were included in the study Table 1.

Procedure

Each patient was counseled and educated about the diet management, exercise, and de-stressing session with yoga.

Diet instructions were given according to the patient dietary habit and were on the basis of ADA 2010 recommendation which includes:

1. 60–65% of carbohydrates of total calorie.
2. 10–15% of protein of total calorie.
3. <25% of fats of total calorie.
4. 25 g fiber/1000 Kcal.

The physical program was well instructed to the patients after proper screening. They were instructed to do brisk walking at least 150 min/ week in different divided sessions. This moderate-intensity aerobic physical activity should raise not more than 50–70% of maximum heart rate. People were encouraged to perform resistance exercise at least 3 times a week. Resistance exercise advised to the patient was seated leg press, chest press, pull down, and leg extension.

De-stressing program included yoga and pranayama. Patients were instructed with proper counseling about the importance of distressing session and their effect on mental and physical well-being. Deep breathing pranayama and concentration yogasana were instructed to the patients.

Table 1: Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
1. Patients with diabetes on medication.	1. Patients with advanced comorbidities.
2. Patients not following lifestyle management properly.	2. Patients of age more than 65 years.
	3. Patients with psychiatric illness.

Pharmacological Treatment

All patients were instructed to take antidiabetic drugs as usual they were taking before the start of the study. They were also instructed to continue other medications such as antihypertensive and lipid-lowering drugs.

Measurements and Data Collection

Following measurements were collected at baseline and again measured after 6 months. The change in outcome measure was analyzed after 6 months.

1. Glycosylated hemoglobin.
2. Serum low-density lipoprotein (LDL).
3. Serum triglyceride.
4. Blood pressure.
5. Body weight.
6. 24 h urinary protein.

Change in drugs, being used by the patient, was not included in measure of lifestyle modification effect on diabetes type 2 management due to complexity in measurement.

RESULT

Clinical and biochemical variables such as weight, blood pressure, glycosylated hemoglobin, serum LDL, serum triglyceride, and 24 h urinary protein were measured at baseline and at the end of follow-up period (6 months) and shown in Table 2. It was noticed that after lifestyle modification, all clinical and biochemical variables were improved and mean changes in these variables are shown in Table 2.

In my study, mean reduction in HbA1C, LDL cholesterol, triglycerides, systolic blood pressure (SBP), diastolic blood pressure (DBP), and 24 h urinary protein is 0.09, 3.32, 16.88, 00.64, 3.68, 2.04, and –232.04, respectively.

DISCUSSION

We conducted a study on 50 patients of type 2 DM to know the effect of lifestyle modification such as dietary advice, exercise, and de-stressing session with yoga and weight reduction. Lifestyle modification in diabetes management is well-known fact but not well practiced by physicians in field. In my study, mean reduction in HbA1C, LDL cholesterol, triglycerides, SBP, DBP, and 24 h urinary protein is 0.09, 3.32, 16.88, 00.64, 3.68, 2.04, and –232.04, respectively.

In this study, there is an improvement in glycated hemoglobin (HbA1C) by 0.09 that is less than the results of the meta-analysis reported by Norris *et al.*^[2] which showed a decrease in HbA1C of 0.28% at the end of 3 months. For a 1% reduction in HbA1C, there was 14%

Table 2: Variables before start of study and variables after 6 months of life style modification program

Variable	Mean at the start of study	Standard deviation	Mean the end of study	Standard deviation	Change in mean
HbA1c (%)	7.52	0.47	7.43	0.38	0.09
LDL (mg/dl)	98.32	13.57	95.00	10.45	3.32
Triglyceride (mg/dl)	166.04	46.15	149.16	25.5	16.88
Body weight (Kg)	58.56	6.49	57.92	6.18	00.64
SBP (mmHg)	135.88	12.86	132.2	9.72	3.68
DBP (mmHg)	85.48	5.39	83.44	3.86	2.04
24 h urinary protein (mg/24 h)	279.6	173.9	262.00	145.9	-234.04

HbA1c: Glycated hemoglobin, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, LDL: low-density lipoprotein, HDL: High-density lipoprotein

reduction in mortality of diabetic patient in the United Kingdom.^[3] This suggests that my finding of 0.09% reduction at 6 months of study could not have much effective impact on the patient mortality. Sanghani *et al.*^[4] conducted a study on 279 patients of DM and observed 0.14% reduction in HbA1c. They observed significant reduction, that is, 0.59% when structured exercise program training group.

A few studies have shown that a lifestyle change program is as effective as other treatments such as drugs. Lifestyle changes were almost twice as effective as metformin therapy in those with impaired glucose tolerance.^[5] In my study, results suggest that lifestyle interventions are just an added factor to pharmacological treatment as all the patient in our study group were still taking medication to control glucose level.

In my study, mean weight loss in patients was 0.64 kg. After 6 months and this was a smaller magnitude that found in other studies.^[6] This might have been due to a lower mean body weight in my participants than the participants in other studies.

The mean change in SBP in my study group is 3.68 mmHg after 6 months. The mean change in DBP is 2.04 mmHg. This change in blood pressure is consistent with the previous studies. In the Premier trial^[7] of hypertensive adults, multi-component behavioral interventions or multiple behavioral intervention plus DASH were compared to on “advice only” group. In the multiple behavioral intervention plus DASH group, the mean net reduction in SBP was 11.1 mmHg and in DBP was 6.4 mmHg.

In this study, the change in lipid components such as LDL and triglyceride also compared from baseline value after 6 months of lifestyle modification program. The mean change in serum LDL after 6 months of lifestyle intervention program is 3.3 mg/dl. The mean change in triglyceride is 16.88 mg/dl. A study done by Ratner^[8] found that the change in LDL cholesterol is not significant, but the change in triglyceride is more significant in intensive lifestyle group.

The change in 24 h urinary protein is mainly due to change in blood pressure and glycemic control. For people with microalbuminuria, controlling blood pressure and achieving near normoglycemia slows the progression to macroalbuminuria and end-stage renal disease.

Chen *et al.*^[9] conducted a meta-analysis to evaluate the effects of comprehensive lifestyle change, such as diet, exercise, and education, on clinical markers that are risk factors for cardiovascular disease in patients with type 2 diabetes. A total of 16 studies were included in the meta-analysis. The standardized difference in means of change from baseline significantly favored the intervention compared with the control group in BMI (-0.29; 95% CI, -0.52-0.06, $P=0.014$), HbA1c (-0.37; 95% CI, -0.59-0.14, $P=0.001$), SBP (-0.16; 95% CI, -0.29-0.03, $P=0.016$), and DBP (-0.27; 95% CI = -0.41-0.12, $P < 0.001$). There was no difference between the intervention and control groups in high-density lipoprotein cholesterol (0.05; 95% CI, -0.10-0.21; $P=0.503$) and LDL-cholesterol (-0.14; 95% CI, -0.29-0.02; $P=0.092$).

CONCLUSION

Comprehensive lifestyle management is an important aspect of diabetes management but the most neglected part of the management program. This study is of very short duration and includes only 50 patients. Further research is needed with larger group with longer follow-up to see the effect of lifestyle modification.

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