Effect Of Diabetes Self-Management and Education (DSME) On Hba1c Levels Of Patients With Diabetes Mellitus

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KEYWORDS

ABSTRACT

Objective: - Diabetes is one of the few diseases in which patient's participation in the treatment is of utmost importance. From daily self-monitoring of blood glucose levels (SMBG) to adjusting diet and insulin doses patient play a direct and vital role in treatment. Present study is conducted to objectively measure the effect of patient's self-management and education (DSME) on glycaemic control.

Material and methods: - A total of 250 diabetic patients were studied in this randomised controlled trial study. The patients were randomised in two equal groups i.e. control group which was getting standard diabetes care and study group which was in addition provided with Diabetic self-management and education. Both group were followed for 6 months duration, HbA1c levels were measured at start and end of the study and compared using test of significance.

Results: - At the end of study there was significant lowering of HbA1c In the study group provided with Diabetes self-management and education as compared to control group which was provided with standard of care treatment.

Introduction

Diabetes mellitus is a group of metabolic disorders characterised by a common phenotype of hyperglycaemia. Chronic hyperglycaemia is associated with long-term damage and dysfunction of eyes, kidneys, nerves, blood vessels and heart.[1]

Diabetes mellitus hits people at the most productive age, slows economic growth, reduces life-expectancy in elders, causes increasing healthcare expenditure. Diabetes mellitus is among the top 10 causes of death and (together with major non communicable diseases (NCDs) – cardiovascular, cancer, respiratory disease) accounts for over 80% premature NCD deaths[1]

Diabetes mellitus has now assumed epidemic proportions in many countries of the world[2]. In 2019 approximately 463 million adults (20-79 years) were living with diabetes. The total number of people living with diabetes is projected to rise to 578 million by 2030 and 700 million by 2045.Three in 4 adults with diabetes live in low- and middle-income countries. Almost 1 in 2 (240 million) adults living with diabetes are undiagnosed.

As a long-term disease, diabetes mellitus needs lifetime care and management. However, 50–80% of patients with diabetes did not have enough skills and knowledge for self-care of the disease. Therefore, Diabetes self-management education (DSME) plays an important role in the clinical management of diabetes. Previous studies have shown that DSME improves homeostasis of metabolism of the patients, and healthy lifestyles prevent the development of atherosclerosis in patients with type 2 diabetes.[4]

DSME has been shown to be cost-effective by reducing hospital admissions. DSME improves haemoglobin A1c (HbA1c) by as much as 1% in people with type 2 diabetes besides this important

role of reductions has a positive effect on other clinical, psychosocial, and behavioural aspects of diabetes reported to reduce the diabetic complications to improve quality of life and lifestyle behaviours such as following healthy diet and engaging with regular physical activity.

DSME is now being incorporated into office practices, medical homes, and accountable care organizations. Receiving DSME in alternative and convenient settings, such as community health centres and pharmacies, and through technology-based programs is becoming more available and affords increased access.[6]

Patients with diabetes should perform certain self-care activities in order to control the progression of the disease. These self-care activities include healthy eating, being physically active, blood sugar monitoring, medication adherence, good problem-solving skills, healthy coping skills, and risk-reduction behaviours. These seven behaviours can be correlated with good glycaemic control, complication reduction, and quality of life improvement.[8] Diabetes self-management education (DSME) and support help people with diabetes to take these decisions and activities to improve health outcomes. DSME education show a great impact to improve their life in diabetic patients and also serve as the basis to minimize and avoid catastrophic diabetes-related complications and the resulting financial and personal costs associated with this disorder.[8]

Therefore, the current study is aimed to evaluate the effect of Diabetes self-management education (DSME) on HbA1C levels which is an important indicator for monitoring blood sugar levels in patients with Diabetes mellitus.

Material and Methods

Two Fifty patients were studied in JLN Medical College and Hospital, Ajmer during the period from 01/12/2019 to 1/11/2021.

After qualifying the study criteria, all patients underwent complete history, physical examination, routine laboratory examination and HbA1c level. The patients were also looked for socioeconomic status by modified Kuppuswamy scale under lower, upper lower, lower middle, upper middle and upper class.

It is an open label randomized control study. Simple randomization was done by taking every alternate candidate in study (Interventional arm) group. All patients were given DSMQ (Diabetes self-management questionnaire) which tested his/her diabetes self-care activities. The Study group patients were then provided with DSME. The education was provided in a structured method focusing on AADE's seven areas of diabetes self-care – "healthy eating, being active, regular blood-sugar monitoring, taking medication on time, problem-solving, reducing risks and healthy coping. The information provided in patient's own language, and each session of DSME was less than 30 minutes by a diabetic educator. Number of sessions were individualized.

After providing the patient with DSME, all patients were followed up for 6 months. HbA1c level was measured again at 6 months and all patients were given DSMQ questionnaire to assess his/her post study self-care activities.

DMSQ questionnaire to asses diabetic self care activities

	The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks, please specify the extent to which each statement applies to you.	Applies to me very much	Applies to me to a consider-able degree	Applies to me to some degree	Does not apply to me
1	I check my blood sugar levels with care and attention. ☐ *Blood sugar measurement is not required as a part of my treatment.*	3	2	1	0
2	The food I choose to eat makes it easy to achieve optimal blood sugar levels.	3	2	1	0
3	I keep all doctors' appointments recommended for my diabetes treatment.	3	2	1	0
4	I take my diabetes medication (e. g. insulin, tablets) as prescribed. ☐ *Diabetes medication / insulin is not required as a part of my treatment.*	3	2	1	0
5	Occasionally I eat lots of sweets or other foods rich in carbohydrates.	3	2	1	0
6	I record my blood sugar levels regularly (or analyse the value chart with my blood glucose meter). ☐ *Blood sugar measurement is not required as a part of my treatment.*	3	2	1	0
7	I tend to avoid diabetes-related doctors' appointments.	3	2	1	0
8	I do regular physical activity to achieve optimal blood sugar levels.	3	2	1	0
9	I strictly follow the dietary recommendations given by my doctor or diabetes specialist.	3	2	1	0
10	I do not check my blood sugar levels frequently enough as would be required for achieving good blood glucose control. ☐ *Blood sugar measurement is not required as a part of my treatment.*	3	2	1	0
11	I avoid physical activity, although it would improve my diabetes.	3	2	1	0
12	I tend to forget to take or skip my diabetes medication (e. g. insulin, tablets). ☐ *Diabetes medication / insulin is not required as a part of my treatment.*	3	2	1	0
13	Sometimes I have real 'food binges' (not triggered by hypoglycaemia).	3	2	1	0
14	Regarding my diabetes care, I should see my medical practitioner(s) more often.	3	2	1	0
15	I tend to skip planned physical activity.	3	2	1	0
16	My diabetes self-care is poor.	3	2	1	0

Results and observations

In the current study, 250 patients' data was analysed. Overall mean age was 49.7 years with std deviation ±14.679. The age of DSME Group ranges from 18 to 92 with mean age of 50.25 and Std. deviation ±15.603 and age of control group ranges from 22 to 82 with mean age of 49.18 std deviation of ±13.735.

There was no significant difference in the age between both the groups.

Among 250 patients analysed in this study, most of the patients 63 (25.2%) belonged to the age group 40 to 50 years. 58 patients were in the age group of 30 - 40 years (23.2%).49 patients were in age group of 50-60 years (19.6%). 40 patients were in 60-70 years (16.0%).20 patients were in age group of more than 70 years (8.0%).14 patients were in age group of 20-30 years (5.6%). 6 patients were in age group of less than 20 years (2.4%).

Among 250 patients included in the study, there were 105 females (42%) and 145 males (58%). 74 males (59.2%) and 51 females (40.8%) were DSME Groups and 71 males (56.8%) and 54 females (43.2%) were Control Groups.

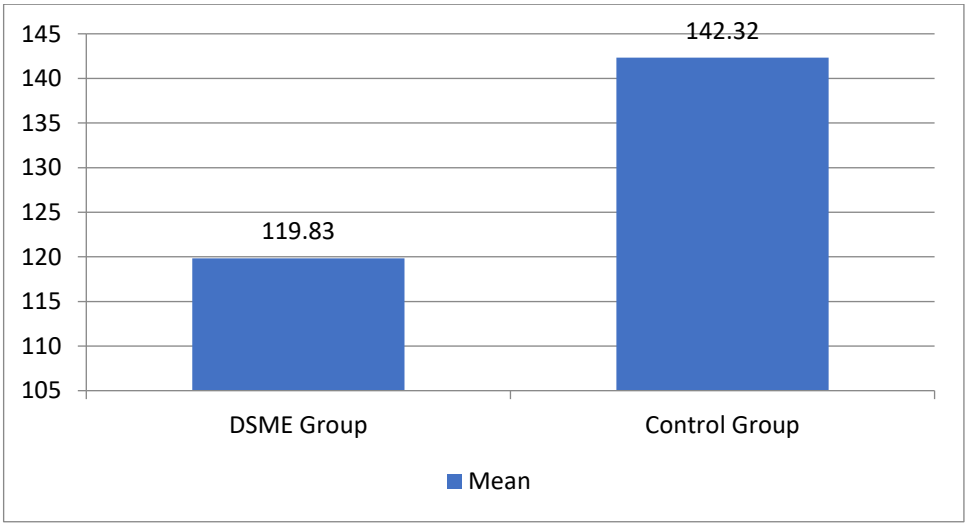
There is no significant difference in gender between the two groups (DSME Groups & Control Groups).

Among 250 patients analysed, mean of pre-study fasting blood sugar was 169.02 with standard deviation ±17.871. In DSME group, mean of pre-study fasting blood sugar was 177.52 with standard deviation ±17.028. In control group, mean of pre-study fasting blood sugar was 160.51 with standard deviation ±14.337.

There is a significant difference in pre study (Fasting Blood Sugar) in DSME Group and Control Groups.

In the Post study analysis, among 250 patients analysed, mean post-study FBS was 131.08 with standard deviation ±18.392. In DSME group, mean post-study FBS was 119.83 with standard deviation ±16.617. In control group, mean post-study FBS was 142.32 with standard deviation ±12.177.

There is a statistically significant difference between change in fasting blood sugar value in DSME group as compared to control group.



POST STUDY (FBS)

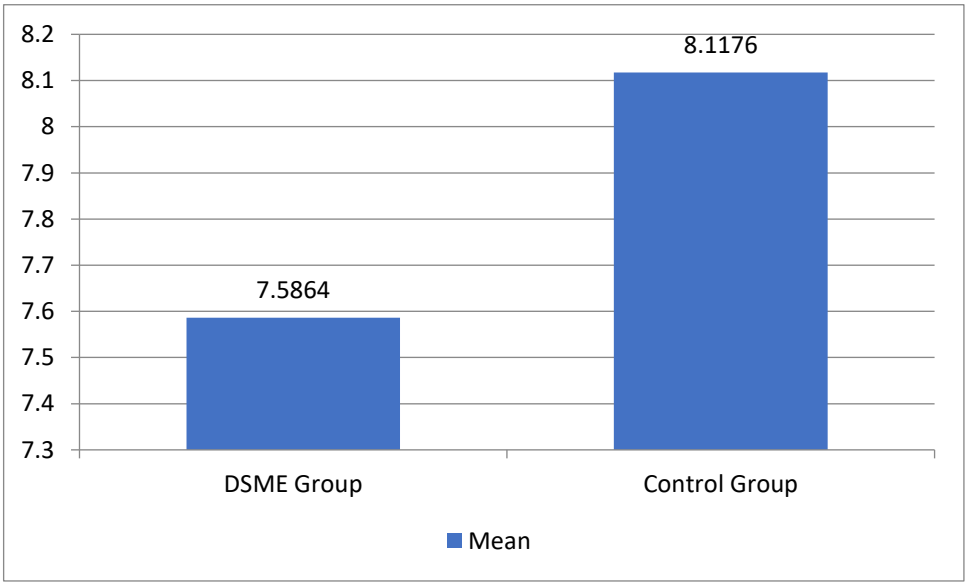
Among 250 patients included in the current study, mean pre-study HBA_1c was 10.0912 with standard deviation ±0.79309. In DSME group, mean pre-study HBA_1c was 9.9824 with standard deviation ±0.77085. In control group, mean pre-study HBA_1c was 10.2000 with standard deviation ±0.80312.

The difference in the mean pre-study HbA1c between DSME and control group is 0.2176 which is statistically not significant

In the Post study analysis, among 250 patients analysed, mean post-study HbA1c was 7.8520 with standard deviation ±0.8771. In DSME group, mean post-study HbA1c was 7.5864 with standard

deviation ±0.76626. In control group, mean post-study HbA1c was 8.1176 with standard deviation ±0.90421

There is a statistically significant difference between change in HbA1c in DSME group as compared to control group.



POST STUDY(HbA1c)

DISCUSSION

In the current study, 250 patients' data was analysed. Among these 250 patients, 125 were DSME Group (intervention group) and 125 were Control Group. DSME Group was provided with DSME. Control Group was not given DSME.

Demographic variables and study details:

Overall mean age of 250 patients was 49.7 years. The age of DSME Groups ranged from 18 to 92 years, and the age of Control Groups ranged from 22 to 82 years. There was no significant difference in the age between both the groups. Most of the patients 63 (25.2%) belonged to the age group 40 to 50 years.

There were 105 females and 145 males among 250 patients. 74 males & 51 females belong were DSME Groups and 71 males & 54 females belong were Control Groups. There is no significant difference in gender between the two comparable groups.

In the study of **Arwani et al. (2019)[20],** 45 patients were included. There is no significant difference in the mean age between DSME Group and Control Group. Mean age was 56 years in Control group and 46 years in DSME Group. More females were included in both DSME Group and Control group

In the study of **Fikadu et al. (2019)[19],** 36 patients belonged to intervention group and 40 patients belonged to comparison group-Control Group. As compared to other studies, our study also did not show any difference in age group.

HbA1c :-

Among 250 patients included in the current study, there is no significant difference in HBA1C at baseline but there is a significant difference in HBA1C among DSME Group and Control Group post study which is 0.5312.

In the study of **Chuang Yuan et al.[4]**, there is significant difference in HBA1C in pre-test and post-test analysis in intervention group and no there is no is significant difference in HBA1C in pre-test and post-test analysis in Control group.

This indicates that DSME has good efficacy in decreasing HbA1c among diabetic patients.

Efficacy of DSME:-

Among 125 DSME Group included in this study, there is a significant difference in pre and post study analysis in FBS, HBA1C &DSMQ score. FBS and HBA1C were less in post study analysis and DSMQ score was more in post study analysis.

CONCLUSION

Diabetes mellitus is a chronic condition. It leads to physical, financial and psychosocial burden worldwide. DSME is a key component of diabetes care [(26)]

Self-management education has to be a continuous process of facilitating the knowledge and skills required for self-care in diabetic patients. It helps in achieving good glycaemic controls which is crucial for preventing long-term complications such as retinopathy, nephropathy, neuropathy. It should be offered to every patient especially in low-resource setting.

Present study shows that DSME results in a significant reduction in HbA1C levels and increase in self-care activities. Diabetes education when provided in systematic manner leads to a better glycaemic control signified by reduction in fasting blood sugar and HbA1c in intervention arm of this study.

In this study, a statistically significant improvement was observed in DSME group patients in the form of diabetes appropriate behaviour, regular monitoring and recording of blood glucose levels together with regular intake of medications. Monitoring of blood glucose at many time-points during the day on a day-to-day basis has been proven to help adjustments in therapy and lifestyle activities and ultimately improve glycaemic control and prevent diabetes-related complications. DSME ensures patient's participation in management of his/her glycaemic control.

Recommendation from this study is to appropriately use diabetes self-management education in diabetes mellitus patients. Evidences and studies till now favour the use of DSME in diabetic patients but further research is also needed to identify the best method of providing DSME and to develop a standardized approach.

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