FDEMS Scoring System - For Objective Assessment of Motivation Level And Achievement of Glycemic Goals in Patients with Type 2 Diabetes Mellitus

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Abstract: Aims and objective: To evaluate the objective assessment of motivation level in patients with type 2 diabetes mellitus (T2DM) by FDEMS scoring system and its correlation with achievement of glycemic goals. Methods: A retrospective, observational study analyzing follow up data of 46 patients with T2DM, using observations recorded at Morning Clinic, Jabalpur (MP, India) was performed from April 2014 to January 2016. The motivation level was objectively assessed with the help of a composite FDEMS score, comprising of following indices - (F) follow up, adherence to (D)dietary & (E)exercise advisory, along with (M)medication compliance and (S, SMBG) self monitoring of blood glucose levels, abbreviated as FDEMS score. The details were collected from the patients follow up charts. A score of 1 was given on satisfactory adherence to each index observed. The composite FDEMS score varied from a maximum of 5 to a minimum of 1. Glycemic control in terms of HbA1c level and change in weight, from baseline was calculated and subjected to statistical analysis. Results: Cohort of patients with higher FDEMS scores (≥3) had a greater proportion of those achieving HbA1c targets respectively as compared to those with lower FDEMS scores (≤2). This difference is statistically significant, in patients with duration of T2DM ≤ 10 yrs (P 0.024). Patients having higher FDEMS score ≥ 3 experienced a greater weight reduction, as compared to patients who had lower FDEMS score ≤2, irrespective of duration of T2DM (P 0.008; diabetes duration ≤ 10 years, P 0.0001; diabetes duration > 10 years). [Sachin K NJIRM 2017; 8(1): 92-96]

Keywords: motivation level; type 2 diabetes mellitus, FDEMS score, glycemic control, SMBG, compliance

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Introduction: American Diabetes Association (ADA) has advocated the importance of motivation level of diabetes patients in terms of routine clinic visit, medical nutrition therapy (MNT), routine exercise, medication compliance and routine self-monitoring of blood glucose (SMBG) and its association with glycemic control[1].

Onset of diabetes mellitus and related complications, can be significantly decreased with the help of particular interventions in patients with high risk for developing type 2 diabetes mellitus (T2DM)[2]. Approximately 58% risk reduction can be achieved by adopting 3 years lifestyle modification along with SMBG[3].

A study performed by Kaufman et al on 360 type 2 diabetes mellitus (T2DM) patients showed that routine clinic visit can significantly reduce the HbA1c level. Patients with 1 to 2 visits during the follow ups had higher HbA1c (9.3 ± 2.0%) as compared to patients who had at least 3 to 4 visits (8.4 ± 1.6%) [4]. Khan et al. reported that patients regularly visiting to doctors clinic has better glycemic control in terms of HbA1c (9.52±2.06% vs 8.99±1.70%) and FPG (179.75±60.81 mg/dl vs 168.8±56.24 mg/dl).

Role of MNT is well established in the prevention of diabetes related complications. Adherence to MNT in T2DM patients has registered a significant decrease in patient's HbA1c by 0.5–2%[1]. Interventions using diet or nutrition therapy has shown to slow the progression for T2DM in people with any sign of metabolic syndrome[3].

Exercise denotes well planned or structured activities whereas physical activity includes all type of activities. Brisk walking which is documented as moderate exercise has shown to ameliorate insulin resistance in young adults[6]. ADA has recommended 150 min/week of moderate-intensity exercise which has showed improvement in glycemia[6]. Evidence has shown that regular physical activity of 150 min/week reduces risk of diabetes related complication in patients with T2DM.[1, 7] Moreover, physical activity and glycemic control have inverse association[8].

Patients compliant to medical therapy and those followed diabetic diet and regular exercise instruction were able to achieve their glycemic targets of less than 7% as reported by Ahmad et al[9]. Moreover, glycemic control was always better in those adherent to their diabetes medications[10,11].

SMBG is widely accepted as a main component of five core component of effective diabetes management [12,13]. Polonsky et al performed a study to evaluate the effect of SMBG on glycemic control and reported that those patients who follow routine SMBG had significantly better glycemic control (P 0.05)[14]. Life style modifications along with routine self-monitoring of blood glucose have significantly contributed in improved glycemic control in both type 1 and T2DM patients[14].

A thorough internet search for scoring systems that objectively assessed the motivation level in patients with T2DM yielded zero matching results. Infact, most of the scoring systems available today are targeted towards screening or prediction of diabetes, in target study population.

In this study, we proposed and test FDEMS scoring system, to objectively assess the motivation level of patients with T2DM. We have also tried to investigate the adherence to five point recommendation or motivation level (follow ups, dietary advice, medication compliance, physical activity and SMBG) in patients with T2DM and its correlation with achievement of glycemic goals.

Methods: An observational retrospective study was performed on 46 T2DM patients between April 2014 to January 2016.

The parameters assessed were change in weight and achievement of HbA1c goal of <7.5% and <7.0%; duration of diabetes, >10 years and ≤ 10 years. The relevant patient data was collected from follow up medical records and by interviewing the patients at Morning Clinic, Jabalpur (Madhya Pradesh, India).

The motivation level was objectively assessed in the form of a composite FDEMS score, comprising of following indices - (F) follow up, (D)dietary & (E)exercise recommendation, along with (M)medication compliance and (S)-SMBG, abbreviated as FDEMS score.

The following instructions (FDEMS) are a routine practice in our clinic so as to improve patient management and keep their motivation up as treatment lifelong. The need for regular follow ups is emphasized in order to titrate the medication dose to optimum, detecting adverse drug reactions, ensuring compliance to therapy and to undergo required laboratory investigations. Each patient is encouraged to have glucometer and for self-monitoring of blood glucose and to detect any suspected episode of hypoglycemia at home. Instruction related to proper use of glucometer is delivered to each patient for their effective disease management.
The scores were calculated as follows:

(F= 1) for atleast 2 follow ups, atleast 3 months apart and not beyond 1 year meant exclusively for assessment of glycemic control.

(D=1) for adequate compliance with dietary advice in line with MNT.

(E=1) for adequate adherence to physical activity as advised (atleast 5 sessions/week, and at least 45 minutes/session. The same was cross confirmed by spouse, family member or friends.

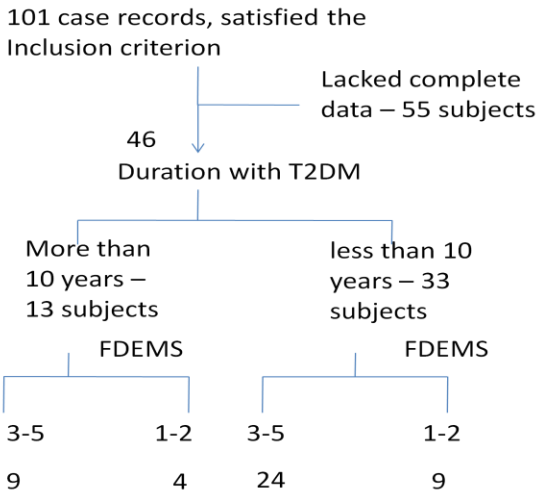
(M=1) for adequate medication compliance, assessed with number of pills and capsules consumed per day, no of strips purchased / month and cross confirmation with accompanying spouse/ family member.

(S=1) for SMBG and presentation of records on follow up, as advised.

As each of these index activities were considered necessary for achievement of glycemic goals, therefore each has been awarded an equal score i.e. 1 (subject to satisfaction of scoring criteria as above) else a score of '0', was awarded. The FDEMS score was calculated as per first follow up visit record. The composite FDEMS score varied from a maximum of 5 to a minimum of 1. The FDEMS score was rechecked at subsequent follow ups, a change in score by 2 points or more, led to subsequent change in subject's FDEMS score, else the previous score was carried forward. A composite FDEMS score of 5, means patients is following all the five recommendations.

Inclusion Criteria: Patients with T2DM and without any significant comorbidities (history of coronary artery disease, moderate to severe renal failure (eGFR < 60 ml/min/m2), stroke, peripheral artery diseases and any other diseases restricting daily routine activity), were included in the study.
Patients who had atleast one initial and two follow up visits to the clinic were included in the analysis.

All the data were analyzed using IBM SPSS- ver.20 software. Analysis was performed using chi-square test and independent sample student t test. P values <0.05 was considered to be significant. The consort diagram is as depicted below:



Results: Patients' medical records from April 2014 to Jan 2016 were screened for in inclusion in the study. A total of 101 case records (initial and follow up visits) were found eligible for analysis, however only 46 patients had ≥2 follow up visits for assessment of glycemic control.

No inter-group demographic difference was found among patients when grouped as per their FDEMS scores 3- 5 (Higher FDEMS, ≥3) and 1-2 (Lower FDEMS, ≤2) scores (table 1). Further, the patients in each subgroup ware quite few, therefore during the analysis; cohorts were divided, depending upon duration of diabetes and higher (≥3) or lower (≤2) FDEMS scores.

Table 1: Demographic data of study population

Duration with T2DM	FDEMS score	Age (years) Mean± SD (at enrolment)	M:F ratio	Diabetes Duration (years) Mean ± SD	N
≤ 10 yrs	3-5	54.7± 11.4	5:3	3.6 ± 2.3	24
	1-2	49.9± 10.9	4:5	3.6 ± 1.3	9
>10 yrs	3-5	67.3± 4.8	2:1	19.0 ± 7.3	9
	1-2	57.8± 8.8	3:1	14.3 ± 1.5	4

N; total number of patients, T2DM; type 2 diabetes mellitus, SD; standard deviation, M: F; male: female

Table 2: Depicting the change in HbA1c (%), in respective cohorts

Duration with T2DM	FDEMS score	HbA1c (%) Mean± SD	Change in HbA1c	P value,Paired t-test*	P value#
≤ 10 yrs	3-5	7.4± 1.7	0.9± 1.7	<0.01	0.024
	1-2	8.7± 1.7	1.7± 1.5	<0.005	
>10 yrs	3-5	7.2± 1.2	-0.1± 1.4	NS	NS
	1-2	8.5± 1.1	-0.3± 1.5	NS	

*between baseline HbA1c and change in HbA1c, # between two FDEMS score, NS; not significant, HbA1c; glycated hemoglobin, T2DM; type 2 diabetes mellitus, P value <0.05 is considered significant

Table 3: Depicting change in Body weight (kgs) in respective cohorts

Duration with T2DM	FDEMS score	Weight (kgs) Mean± SD	Change in Weight	P value, paired t-test*	P value#
≤ 10 yrs	3-5	71.7± 10.3	0.54± 4.4	NS	0.0008
	1-2	69.3± 7.7	-0.43± 2.7	NS	
>10 yrs	3-5	76.7± 11.4	2.54± 4.9	NS	<0.0001
	1-2	81.5± 8.2	-3.0± 5.1	NS	

*between baseline weight and change in weight, # between two FDEMS score, T2DM; type 2 diabetes mellitus, NS; not significant, P value <0.05 is considered significant

Table 4: Percentage of patients who achieved HbA1c and weight reduction targets as per American Diabetes Association, in respective cohorts

Duration with T2DM	FDEMS score	N	Patients achieving HbA1c targets n (%)	Patients achieving weight reduction of 5% n (%)
≤ 10 yrs	3-5	24	17 (70)	5 (21)
	1-2	9	5 (55)	1(11)
>10 yrs	3-5	9	5 (55)	1(11)
	1-2	5	1(20)	1(20)

ADA; American diabetes association, T2DM; type 2 diabetes mellitus.

Discussion: The paradoxical finding in, patients with short duration of diabetes (≤ 10 yrs) and a low FDEMS scores (≤2) can be explained by their young age, higher baseline HbA1c, lower weight at enrollment and a higher female preponderance.

The difference in change in HbA1c in patients with T2DM for ≤10 years and having a higher FDEMS score (≥3) as compared to those with similar duration of disease and a lower FDEMS score (≤2) was significant (P 0.024,Table2). This result can be inferred as that adherence to five point recommendation when followed properly by thepa tient or a higher motivation level in patients with T2DM, yielded a higher FDEMS score and was helpful in achieving glycemic goal. Similar to present study, Garcıa-Perez et al in their review advocated the importance of healthy diet and exercise regimen along with proper medication. They reported that patients, who were highly motivated towards diabetes diet and regular exercise, were able to achieve their glycemic targets [15, 16].

The improvement in HbA1c in cohort with higher and low FDEMS scores in patients with duration of T2DM >10 years were -0.1 and -0.3% respectively (p>0.05; Table 2). The lack of statistical significance between the two groups could be because of lower baseline values and lack of significant effect of dietary recommendations. Dietary recommendations are quite effective in new onset/ recent onset T2DM[12]. However, studies with larger population and longer follow ups may validate this finding in patients with long standing T2DM. Further research is needed to establish and confirm this observation. Patients having higher FDEMS score experienced a greater weight reduction as compared to patients who had lower FDEMS score, irrespective of duration of T2DM and the difference was highly significant (P 0.008 and 0.0001 respectively; Table-3). Patients with duration of T2DM, more than 10 years and having a high FDEMS score had the maximum weight reduction (-2.54 ± 4.9 kgs) as compared to patients with similar duration of T2DM but with lower FDEMS score (-3.0 ± 5 kgs). ADA has also documented that diet, physical activity and regular SMBG is associated with 5% weight loss in T2DM patients leading to better glycemic control and can also decrease the need of anti-diabetic medication[17,18]. The Results are consistent with the previous studies which have reported the importance of above said five point motivation level criteria. [4, 5, 6, 9, 15] However, an interesting finding is there is no- intergroup difference among patients with FDEMS score ≥ 3, therefore an additional recommendation, to treat FDEMS score ≥3 as an optimal score and an indicator of adequate motivation level of subject with T2DM, can be made.

Conclusion: Those patients who regularly followed the five-point recommendation indicating a high motivation level had high FDEMS score. Patients with high FDEMS score had better glycemic control in terms of HbA1c, especially in those with duration of T2DM ≤ 10 yrs and had significant weight loss, irrespective of duration with T2DM, which is in sync with previous studies. Therefore, FDEMS scoring system is a useful scoring system, for assessment of motivation level of patients with T2DM. Larger studies can be taken up to further validate this scoring system.

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