Prevalence of Fear of Hypoglycemic Attack in Patients with Uncontrolled Diabetes Mellitus and Correlation Analysis in Diabetes

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Abstract

Background: Diabetes is chronic illness in nature, and patients are having difficulties in achieving optimal diabetes control. As there is no cure for diabetes, the main aim of diabetes treatment is to optimize glycemic control. People with uncontrolled diabetes are at higher risk of psychological problems such as fear of hypoglycemic attack (FHA) than the general population.

Aim: To study the prevalence of FHA in patients with uncontrolled diabetes mellitus (DM) and correlation analysis of these factors in diabetes.

Settings and Design: Tertiary care private sector in northern Karnataka. This study was cross-sectional observational study.

Materials and Methods: We included person diagnosed with DM having uncontrolled diabetes status measured by one previous hemoglobin A1c (HbA1c) between 8.2% and 15.0%. The existence of FHA was evaluated by fear of hypoglycemic survey (FHS) tool. Socio-demographic data and duration of diabetes were obtained from semi-structured questionnaires.

Statistical Analysis: The data were analyzed using Pearson correlation analysis.

Results: We included total 100 patients in this study. Results suggest a high level of neuropathy and retinopathy. The most common FHA was "Eat large snacks at bed time" and "Eat something as soon as I feel the first sign of low sugar." There was a strong correlation between Hb1Ac and FHS total score.

Conclusion: We found higher levels FHA among uncontrolled DM. Strong positive correlation exists between uncontrolled diabetes and Hb1Ac.

Key words: Fear, Hemoglobin A1c, Hypoglycemic attacks, Uncontrolled diabetes mellitus

INTRODUCTION

Fear of having a hypoglycemic episode is one of the most common worries for people with type 1 and type 2 diabetes and is associated with sub-optimal glycemic control. The fear of hypoglycemia is related to thoughts of being out of control, being vulnerable and dependent on others and the public humiliation and embarrassment, as well as fear for one's own safety and of dying. Other factors that may lead to excessive worry include the inability to feel the symptoms of hypoglycemia (hypoglycemic unawareness or reduced hypoglycemic awareness) and misattributing symptoms of anxiety to hypoglycemia.[1,2]

Hypoglycemia was shown to be independently associated with lower patient utility, and that disutility increases with severity of hypoglycemic episode in the present study. Similar, although non-significant, results were obtained in a study of Swedish type 2 diabetic patients treated with oral antihyperglycemic agents and/or insulin. Based on the EQ-5D, Lundkvist *et al.* reported a utility decrement of 0.047 ($P = 0.120$) for patients experiencing any

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hypoglycemia in the preceding month, after adjusting for gender, insulin use, and hypoglycemia group (symptomatic, mild or severe).[3] The relationship between severity of hypoglycemic episode and patient disutility in the present analysis was similar to that reported for French patients with type 2 diabetes treated with a combination of metformin and sulfonylurea.

Hypoglycemia is practically a part of life for individuals with type 1 diabetes and individuals with long-term type 2 diabetes.[4] It is also known as a main barrier to achieving glycemic goals In particular, severe and recurrent hypoglycemia lead to fear of hypoglycemia, which negatively affects diabetes adherence and metabolic control. Patients with high hypoglycemia fear may engage in behaviors such as overeating, taking less insulin than required, or limiting daily-life activities (e.g., exercising, driving, shopping, visiting friends) to avoid hypoglycemia. However, these types of coping strategies lead to poor metabolic control and increase the risk of health problems related to diabetes and psychosocial difficulties.[1] The signs and symptoms of hypoglycemia differ from one individual to another. Factors such as old age, long diagnosis period, and the existence of complications impair hypoglycemia awareness. Studies have determined that 33% of individuals with diagnosis periods longer than 15 years have hypoglycemia unawareness (i.e., they are unaware of the signs and symptoms of hypoglycemia). This has been found to increase the risk of serious hypoglycemia, which increases hypoglycemia fear. In particular, patients who experience sudden hypoglycemic attacks worry about losing control, experiencing hypoglycemia while alone or sleeping or making a mistake or having an accident during an attack.[5] Because they might not have time to treat their hypoglycemia and might lose consciousness suddenly, hypoglycemia has the potential to be life threatening.

Vexiau *et al.* reported HFS scores that increased by 7.9 for any hypoglycemia, and by 5.8 for mild episodes, 11.1 for moderate, and 13.4 for severe episodes after adjusting for patient and disease characteristics. Although these decrements are smaller overall than those found in the present study, the positive linear association between severity of hypoglycemic episode and greater fear is consistent. In general, patients who experience severe and/or frequent hypoglycemic episodes report lower general health and greater fear of hypoglycemic events compared with patients who do not experience hypoglycemia.

The need to avoid hypoglycemia and the long-term consequences of hyperglycemia remain a challenge in disease management. Patients may prioritize the immediate risk of hypoglycemia over the possibility of future health problems. It has been suggested that patients may intentionally take less diabetes medication (i.e. reduce treatment compliance) or over-eat to increase their blood glucose level to avoid hypoglycemia.[6,7] Hypoglycemic episodes not only impact the daily clinical management and well-being of patients, but the fear resulting from the side effect may negatively impact long-term diabetes outcomes if acceptable glucose levels are not maintained.

Studies on fear of hypoglycemic in uncontrolled diabetes are very few, especially in Indian setting very knowledge about diabetes and its complication are less. Hence, we evaluated these short comings in Indian setting

Aims and Objective
To study, the prevalence of fear of hypoglycemic disorder in uncontrolled diabetes mellitus (DM).

Design
Cross-sectional study using standard screening tools.

Setting
Tertiary care centre in northern Karnataka.

Inclusion Criteria
1. DM was defined according to the World Health Organization criteria
2. Either they are on oral hypoglycemic agents and/or on insulin therapy
3. Age between 18 and 65 years
4. With one previous HbA1c of between 8.2% and 15.0%, identified by the treating physician.

Exclusion Criteria
a. Pregnancy or attending a pre-pregnancy clinic
b. Acute or serious medical illness as defined by treating physician
c. Advanced diabetes complications (such as registered blind or serum creatinine values >300 mmol/l)
d. Known hemaglobinopathy or severe mental disorder.

Tools
Semi-structured questionnaire to measure socio-demographic data and hypoglycemia fear survey (HFS) to measure fear of hypoglycemia. HFS, developed by Cox *et al.* (1987), is a 27-item questionnaire with two subscales that measure (a) behaviors aimed at avoiding hypoglycemia and its negative consequences and (b) worries about hypoglycemia and its negative consequences. Responses are made on a 5-point Likert scale where 0 means never and 4 means always. Both subscales were used in this study, and higher scores indicated increased fear of hypoglycemia. Internal consistency reliability (Cronbach's alpha) for the behavior subscale, worry subscale, and total HFS was found to be 0.77, 0.91, and 0.90, respectively.

RESULTS

Socio-demographic Data

We included total 100 number of subject who fulfilled inclusion and exclusion criteria. Semi-structured questionnaire was used to look for socio-demographic data. The results suggest mean age of presentation was 57 years, the majority were males, and married, belongs to Hindu religion from urban background with mean educational status of 7 years (Tables 1 and 4).

To evaluate for diabetic status and its related complication, we used clinician based evaluation and some bedside and laboratory test. The results are as shown in Table 2. Mean duration of diabetes was 8 years with minimum new case to maximum 30 years duration. Mean hemoglobin A1c (Hb1Ac) was 8.32. The maximum possible score in fear of hypoglycemic attack (FHA) was 135 and minimum score by this scale was 27. We found mean score of FHA 35 with minimum score 27 and maximum score 65.9 (Table 5). The most common FHA behavior was observed was "eat large snacks at bed time" followed by "Eat something as soon as I feel the first sign of low sugar" and "Carry fast acting sugar with me." The least fear was observed in "Avoid lot of exercise when I think my sugar is low." These behaviors were developed following few episode of hypoglycemic attack or instruction by the treating physician. Avoiding exercise comes only when person on regular exercise for diabetes (Table 3). The most common worry among these individuals were "feeling dizzy or passing out in a public" followed by "Having seizure or convulsion and having a reaction while driving." The least worry or not single patient have bothered about "Embarrassing myself/my friends/family in social situation."

The correlation analysis has shown a strong positive correlation between Hb1Ac and total score of FHA, i.e., 0.79. This suggests higher the Hb1Ac higher will be the fear of hypoglycemic score and lower the Hb1Ac lower the FHA score. In another analysis between duration of diabetes and FHA score, it was a weak positive correlation. A value of 0.12 suggests FH is irrespective of duration of DM.

DISCUSSION

The socio-demographic data of this study represents clinical profile of private sector institution. Majority of them were in the middle age group. About 60% were male and another 40% were female. The prevalence of type 2 DM was the more common in the community and also treatment seeking is more in this population. The mean duration of diabetes was 8 years which suggest majority were suffering with diabetes for significant duration and stress and psychiatric disorder are more among longer duration suffering. Similar results have been found by Amit Raval *et al.* study where the mean duration of the study was 8 years.[8] We have included minimum Hb1Ac should be more than 8 which suggest uncontrolled diabetes. The prevalence of various psychological phenomenon such as burnout and FHA was more common among these population. The maximum possible score in FHA was 135 and minimum score by this scale was 27. We found a mean score of FHA 35 with minimum score 27 and maximum score 65. This suggests though majority of them were suffering from one or other symptoms of FHA but symptoms were not high enough to seek psychiatric help.

Table 1: Demography

Age minimum	30
Maximum	84
Mean±SD	56.98±12.0
Sex	
Male	61
Female	39
Marital status (%)	
Married	98
Unmarried	2
Education	
Minimum	0
Maximum	18
Mean±SD	7.94±4.8
Religion (%)	
Hindu	96
Muslim	4
Region (%)	
Rural	42
Urban	58

SD: Standard deviation

Table 2: Diabetic profile

Duration of diabetes	
Minimum	New case
Maximum	30 years
Mean±SD	7.9±7.3
Hb1Ac	
Minimum	8.2
Maximum	14.21
Mean±SD	8.32±1.8
Neuropathy (%)	
Yes	33.3
No	66.7
Nephropathy (%)	
Yes	10
No	90
Retinopathy (%)	
Yes	21.7
No	78.3
Stroke/MI (%)	
Yes	11.7
No	88.3
Diabetic foot (%)	
Yes	13.3
No	88.3

SD: Standard deviation, MI: Myocardial infarction

Table 3: Fear of hypoglycemia attack

Behavior	Never	Rarely	Sometimes	Often	Very often
Eat large snacks at bed time	43	42	15	0	0
Avoid being alone when my sugar is likely to be low	65	32	2	2	0
If test a urine, spill little sugar on safe side, if test blood glucose, run little high to be safe side	78	20	0	0	2
Keep my sugar higher when I will be alone for while	55	37	2	2	4
Eat something as soon as I feel the first sign of low sugar	47	48	3	2	0
Reduce my medication when I think my sugar is too low	78	20	3	0	0
Keep my blood sugar higher when I plan to be in a long meeting or a party	58	37	3	2	0
Carry fast acting sugar with me	57	38	2	3	0
Avoid lot of exercise when I think my sugar is low	92	7	0	2	0
Check my blood sugar often when I plan to be in a long meeting or out to party	67	28	0	2	4
Worry					
Not recognizing/realizing I am having reaction	78	18	0	0	4
Not having food fruit, juice with me	75	22	3	0	0
Feeling dizzy or passing out in a public	60	32	3	2	3
Having reaction while asleep	93	5	0	0	2
Embarrassing myself/my friends/family in social situation	100	0	0	0	0
Having reaction while alone	95	5	0	0	0
Appearing stupid or drunk	98	2	0	0	0
Loosing control	92	8	0	0	0
No one be around to help me during reaction	96	2	0	0	2
Having reaction while driving	76	22	0	0	2
Making mistake or having accident at work	86	12	2	0	0
Getting bad evaluation at work because of something that happens when my sugar is low	92	6	0	0	2
Having seizure or convulsion	75	25	0	0	0
Difficulty thinking clearly when responsible for others	88	12	0	0	0
Developing long term complication from frequent low blood sugar	92	8	0	0	0
Feeling light headed or faint	95	5	0	0	0
Having insulin reaction	97	3	0	0	0

N=100 (in percentage)

Table 4: Correlation analysis of hypoglycemic fear survey and diabetic profile

Correlations	DM duration	HbA1c	Total score (27)
DM duration			
Pearson correlation	1	0.142	0.154
Sig. (2-tailed)		0.159	0.126
N	100	100	1000
HbA1c			
Pearson correlation	0.142	1	−0.026
Sig. (2-tailed)	0.159		0.796
N	100	100	100
Total score (27)			
Pearson correlation	0.154	−0.026	1
Sig. (2-tailed)	0.126	0.796	
N	100	100	100

DM: Diabetes mellitus, HbA1c: Hemoglobin A1c

Table 5: score of FHA

Parameters	Total score (27)	DM duration
N		
Valid	100	100
Missing	0	0
Mean	35.07	9.21
Median	33.00	7.00
Standard deviation	8.384	8.037
Minimum	27	0
Maximum	65	30

DM: Diabetes mellitus

The most common FHA behavior was observed was "eat large snacks at bed time" followed by "Eat something as soon as I feel the first sign of low sugar" and "Carry fast acting sugar with me." The least fear was observed in "Avoid lot of exercise when I think my sugar is low." These behaviors were developed following few episode of hypoglycemic attack or instruction by the treating physician. Avoiding exercise comes only when person on regular exercise for diabetes. But in our patient population, this behavior is least observed probably they are not aware about role of exercise in blood sugar control. The most common worry among these individuals were "Feeling dizzy or passing out in a public" followed by "Having seizure or convulsion and having reaction while driving." The least worry or not single patient have bothered about "Embarrassing myself/my friends/family in social situation."

The correlation analysis has shown a strong positive correlation between Hb1Ac and total score of FHA, i.e., 0.79. This suggests higher the Hb1Ac higher will be the fear of hypoglycemic score and lower the Hb1Ac lower the FHA score. The interpretation suggests in those who are suffering from uncontrolled diabetes are prone for developing FHA. In another analysis between duration of diabetes and FHA score, it was a weak positive correlation. A value of 0.12 suggests FH is irrespective of the duration of DM.

CONCLUSION

This study is the unique study due to the evaluation of hypoglycemic attack study done on uncontrolled DM patients. Second, this study has shown a high prevalence of psychological symptoms among this population. This also showed strong positive correlation between HB1Ac and FHA score. Hence, we need evaluate patients with uncontrolled DM for the prevalence of psychological problems and should be addressed properly.

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