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Original Article

Pharmacology Section

# Assessment of Knowledge of Self Blood Glucose Monitoring and Extent of Self Titration of Anti-Diabetic Drugs among Diabetes Mellitus Patients – A Cross Sectional, Community Based Study

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## ABSTRACT

**Introduction:** Self blood glucose monitoring is an important context of self care in the management of diabetes mellitus. All the guidelines must be followed while performing self blood glucose monitoring and tracking of values is essential to facilitate the physician while titrating the drugs and /or doses of anti diabetes medication. Self titration by patients following self monitoring must be discouraged.

**Aim:** To assess the knowledge and practice of self blood glucose monitoring among diabetes patients and extent of self titration of anti diabetes medicines among diabetes patients based on self blood glucose monitoring.

**Materials and Methods:** This pilot, cross-sectional, observational study was conducted using a validated questionnaire among adult male and female diabetes patients performing self blood glucose monitoring at home. Diabetes patients with complications and juvenile diabetes patients were excluded.

**Results:** Out of 153 patients surveyed, only 37 (24.1%) (20 males, 17 females) patients were aware and have been following self blood glucose monitoring appropriately. About 116 (75.8%) (64 males, 52 females) of patients were devoid of adequate knowledge and did not practice self blood glucose monitoring in a proper way. Ninety eight (64.05%) accepted that they self titrate their anti diabetic medicines based on self monitoring.

**Conclusion:** Self monitoring of blood glucose should be encouraged and patients should be taught importance of following correct steps and tracking of self monitoring by physician or diabetes educator.

**Keywords:** Diabetes educator, Self care in diabetes, Tracking of blood sugar

## INTRODUCTION

Epidemiologic transition, urbanization, changes in life style and food practice culminates in increasing incidence of metabolic syndrome consists of diabetes, dyslipidaemia and hypertension. India is projected to reach pinnacle of world diabetes population in another decade. It is estimated that people with diabetes will be around 70 million in India by 2025 [1,2]. Morbidity and mortality of diabetes is more among South East Asian continent than the rest of the world. Various factors affects management of diabetes difficult in our population including suboptimal health literacy, hindered health accessibility, poor socioeconomic status, etc. One of the important factor quoted for aforesaid statement is less awareness and practice of self care in diabetes in our population when compared with the west, it carries huge importance in diabetes management as it is an individual tool to control diabetes and achieve good quality of life [3,4].

Self care in diabetes includes periodic follow-up, adhering to medicine, foot care and regular monitoring of patient glycaemic level. Self monitoring of glucose is an essential component in diabetes self care. Owing to widespread media alerts, self monitoring is escalating among urban India for diabetes as well as hypertension. Self blood glucose monitoring has to be done meticulously. It must be guided by physician and perform carefully by patients. All the recommended steps for self blood glucose monitoring must be followed at every time when they performed self monitoring. When self blood glucose monitoring not performed with care, results will be of error [5]. There are only western data available on knowledge and practice of self glucose pressure monitoring by diabetes patients, it is an inevitable to assess SBGM practice among our population. It is also not uncommon, patient tend to change dose of their medicine by skipping or taking more pills based SBGM which can lead to disturbed glycaemic control and even results in life threatening complications like hypoglycaemia. This cross -sectional study was done to assess the patient's knowledge and practice SBGM and their tendency to self titrate antidiabetic medicines based on self monitoring.

## MATERIALS AND METHODS

Our study was duly approved by scientific review board and Institutional Ethics committee of our institute (IEC) (ECR/724/Inst/TN/2015).

### Study Design and Duration

This was a pilot, cross-sectional observational study conducted between July and October 2015 by the Department of Pharmacology, Saveetha Medical College across diabetes population of Chennai, Tamil Nadu using well constructed questionnaire which was validated by experts including General Medicine, Pharmacology and Biostatistics. The suitability was tested by Cronbach's alpha percentage of 0.81 which was by staticaly experts.

### Inclusion Criteria

Adult male and female patients with Type II diabetes mellitus performing self blood sugar monitoring at home.

Those who are willing to participate in our study and giving informed consent.

### Exclusion Criteria

Type I diabetes mellitus patients.

Diabetes patients with acute complications.

### Study Procedure

After obtaining permission from IEC, diabetic patients who were willing to take part in our study after being read and explained the information sheet and signing the informed consent was interviewed with study questionnaire. Demographic details and history related to their diabetes was noted be. Procedure consist of answering set of questions regarding monitoring of blood glucose by themselves which was put forth by the investigator and patient's answers for the same were noted. At the end correct information regarding self blood pressure monitoring and side effects of self adjusting anti diabetic drugs and insulin drug was explained to our patients.

## STATISTICAL ANALYSIS

Data was tabulated using MS Excel and analysis was done using SPSS version 17.

## RESULTS

Out of 153 patients, 37 (24.1%) (20 males, 17 females) patients possessed adequate knowledge on self blood glucose monitoring whereas 116 (64 males, 52 females) (75.8%) patients did not aware and not following steps of self monitoring properly. Seventy two patients learnt self monitoring by physician and ninety eight (64.05%) admitted themselves either they skip or taking more units on insulin without consulting their physician. A total of 132 (86.2%) patients expressed that they could recognise symptoms of hypoglycaemia. Only 43 (28.1%) patients regularly record their blood sugar values found by self monitoring. Percentage of other responses by the participants is mentioned in the [Table/Fig-1].

| S No | Questions asked | Response given by the participants (Total Number 153) | |
|---|---|---|---|
| | | Yes | No |
| 1. | Are you taking regular follow up for diabetes? | 89 58.1% | 64 41.83% |
| 2. | Did you buy monitoring instrument based on your physician advice | 91 59.4% | 62 40. 5% |
| 3. | Have you been taught at least once how to do self monitoring by your physician | 72 47.05% | 81 52.9% |
| 4. | Do you wash your hand and let it dry before measuring | 59 38.6% | 94 61.4% |
| 5. | Do you blow your hand to make it dry before measuring? (Out of 59 responders said 'Yes' to previous question) | 37 62.1% | 22 37.28% |
| 6. | Do you puncture same finger every time | 67 43.7% | 86 56.20% |
| 7. | Do you measure the level with first drop of blood from finger | 93 60.7 % | 60 39.3% |
| 8. | Do you discard needle /lancet after using once | 97 63.3% | 56 36.6% |
| 9. | Do you regularly record the measured sugar levels till you consult your physician | 43 28.1% | 110 71.8% |
| 10. | Do you skip or take more medicine after self monitoring of sugar before consulting your physician | 92 60.1% | 61 39.8% |
| 11. | Do you adjust your insulin/tablets dose after self monitoring of sugar before consulting your physician | 98 64.05% | 55 35.9% |
| 12. | Do you know your antidiabetes /insulin diabetes drug name and dose | 116 75.8% | 37 24.1% |
| 13. | Do you know your antidiabetic drugs common adverse effects | 107 69.9% | 46 30.06% |
| 14. | Can you recognise symptoms of hypoglycaemia (Low Blood sugar) | 132 86.2% | 21 13.7% |
| 15. | Have You been to symptomatic hypoglycaemia (Low Blood sugar) | 87 56.8% | 66 43.1% |

**[Table/Fig-1]:** Response given by the participants regarding self monitoring on blood glucose.

## DISCUSSION

This study was carried to assess the diabetes patients knowledge about self blood glucose monitoring and to know whether appropriate steps followed by them or not. Also, we made an attempt to find the extent self of titration of antidiabetic medicine by patients based on self monitoring.

It is now well known that half of diabetics are asymptomatic and half of those diagnosed already crosses considerable latent years before treatment. Regular self monitoring and treatment of blood glucose helps to prevent all further microvascular and macrovascular complications [6,7]. Serial monitoring helps to adjust anti diabetic medications and warn patients as well as physicians when blood glucose gone extremely high or low [8]. In our study only 24.1% percentage of patients follows the necessary steps in SBMG while other obviates one or many vital steps. This is too low to corroborate our result with western population where the percentage approaches 60% and clearly depicts the need of awareness among our population [9].

Ideally, patient should be advised to get validated instrument and taught by physicians in his clinic about all steps of SBGM. In our study nearly half of our patients had not been taught by the physicians instead they learnt from paramedical persons, friends and relatives. SBGM instrument must be kept in a place that is devoid of direct sun light. Before performing hand must be washed through and let it dry, patients should not blow it. Again, aforesaid principles are not followed by considerable number of our study population. Similar, deficiencies were quoted by the study conducted by Choudhury et al., regarding knowledge and practice of insulin use in eastern part of India [10]. Digits excluding index and thumb should be used but pricking same digit or site should be avoided. Next to digit, outer palm is comparably accurate method as digits while other sites such thighs are not recommended. Finger should be pierced using lancet using one per each prick. A gentle pressure may be applied on the sides and it is preferable to keep a second drop of blood in the canister. Lancet should be covered with hard plastic cover during disposal [11].

The significant finding of our studyshow that more than two third of the patients articulated that they could recognise symptoms of hypoglycaemic episode and they are aware of their drug name (Brand name only) and the common adverse effects of those drugs, despite knowing these percent of patients self titrate their regular insulin /oral hypoglycaemic agents. Two common reasons quoted for self titration includes inaccessibility to physician and hard timings. SBGM may not be accurate there may be fair differences in blood glucose values when it is measured by venous blood. Twenty percent of such difference is acceptable when it is considered for monitoring purpose but titration of medicine should never be done without consulting physician. Hypoglycaemia as a result of self titration can be life threatening to diabetes patients and patient should be warned for this complication [12-14].

Another significant finding of our study is only very low percentage of patients tracking their blood sugar level on regular basis, other do not possess habit of noting their blood sugar level till they meet their consultant and practically nobody take their SBMG instrument to their doctor or their diabetic counsellor to check its accuracy and efficiency. Diabetic counsellor should be available in every institution as they educate self care in diabetes, they can educate patients in SBGM in place of physician [15,16].

Various guidelines given by American Diabetes Association, Canadian diabetes society regarding self monitoring of blood sugar. These guidelines must be taught by the physicians to their patients. Simplified suggestions from those guidelines for the physicians and patients are mentioned in [Table/Fig-2,3] [17-19].

| |
|---|
| Advice your patient to buy a validated instrument for self blood glucose monitoring.<br>Demonstrate steps of SBMG to the patient at least once.<br>Clearly dictate them timing and frequency of self monitoring as it may vary depending of patient diabetic profile.<br>Advice your patients to write their glucose values found during self checking till they consult you.<br>Educate them about ill effects of self titration of diabetes medications. |

**[Table/Fig-2]:** Points to remember for physicians regarding self blood glucose monitoring to advice their patients.

| |
|---|
| Buy a validated instrument based on physician advice and learn all the steps of performing SBGM from him or her .<br>Ask your physician abbot frequency and timing of SBGM.<br>While performing self monitoring, wash your hand with plain water and let it dry on its own.<br>Use a sterile lancet every time to do a prick on finger tip or outer palm.<br>Avoid first drop of blood and keep the next drop in the canister.<br>Discard lancet carefully after capping it.<br>Note blood sugar value in a diary during each prick. Keep your tracking diary when your visit your doctor.<br>Understand, instrument may be erroneous at times. Be guarded when you get abnormal values and consult your physician as early as possible to ascertain that is an instrumental error.<br>Never skip or take more pills /insulin shots without physician advice.<br>Always carry SBGM machine your during your travel. |

**[Table/Fig-3]:** Points to remember for patients regarding self blood glucose monitoring to advice their patients.

## CONCLUSION

Self blood glucose monitoring is an inevitable tool to track patient diabetes profile. All the guidelines must be taught by physician and followed by patient for accurate monitoring. Making available a diabetes educator in every hospital is an essential steps to educate the general public on self monitoring of blood glucose.

## LIMITATIONS

We focused this pilot study only on urban population who perform SBMG and no attempt was made to sub classify the participants knowledge based on sex, education, occupation and geographical location which needs more number of sample size to increase power of the conclusion.

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