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# To Assess Medication Compliance and Self Care Practices in Patients with Diabetes Mellitus

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## ABSTRACT

**Background:** The global rise in the prevalence of diabetes mellitus and a wide variation in compliance to self-management of diabetes has become a challenging health care problem. Poor glycaemic control can lead to treatment failures and accelerated development of various diabetes-related complications. Our study aims to find out the compliance rate of the patients with type 2 diabetes to the prescribed medications and to find out its comparison across various socio-demographic variables. **Methods:** This is a cross sectional questionnaire based study that was conducted amongst patients with type 2 diabetes mellitus. A total of 136 patients were included in the study and interviewed by using a pre tested, structured interview schedule which captured socio-demographic variables and Diabetes Self-Management Questionnaire covering different aspects of diabetes self-management. Participants rate the extent to which each description applies to them on a four-point Likert scale.

**Results:** Mean age of the participants was $44.53 \pm 8.13$. The mean duration of diabetes was $7.63 \pm 6.49$ years. The overall compliance score in our participants was $23.44 \pm 4.17$. None of the participants stated that they check their blood sugar levels regularly. Of self-care activities, 69.1% of the patients agree that they do not skip their diabetes medication. Compliance to the diabetes self-care decreased significantly with an increase in age ($p<0.001$) and duration of disease ($p<0.01$). The mean compliance score was also significantly lower among those who were illiterate ($p<0.001$) and unskilled workers ($p=0.02$).

**Conclusion:** It can be concluded that the compliance score was not good among the participants. Significant association have been found between mean compliance scores and increasing age, illiteracy, unskilled occupation and longer duration of disease.

**Key words:** Adherence, compliance, diabetes self-management, insulin self-administration

## INTRODUCTION

India is currently considered as the diabetes capital of the world. The International Diabetes Federation has estimated the total number of diabetes cases to be around 40.9 million in India which will further rise to 69.9 million by the year 2025.[1] Evidence abound that the most important predictor of reduction of morbidity and mortality due to the complications of diabetes is the level of glycaemic control achieved by the patients.[2] To achieve a good glycaemic control patients' self-management is of great importance which demands lifelong commitment to medication adherence and lifestyle modifications. Adherence to treatment has been recognized to be a major problem in patients with chronic illness.[3] Better glycaemic control is only possible by good adherence to antidiabetic regimens,

proper practice of insulin self-administration and self-management by the patient because the vast majority of daily care is handled by the patient himself.[4]

Poor adherence to treatment of chronic disease is rampant worldwide contributing to worsening of disease, increased morbidity and increased healthcare costs. The WHO has stated that only 50% of the patients diagnosed with chronic illness are fully compliant with their treatment regimen, in the developing country the rate are even lower. Illiteracy, poor access to health care, lack of family support are some important factors that are found to be associated with poor compliance in management of diabetes mellitus.[5] These findings are further dependent on the socio-demographic

variables of the population due to differences in lifestyle patterns. Very few studies have been done in India to identify the problem of compliance to antidiabetic drugs, especially the practice of Insulin administration. There is a continuing need for the responsive authorities to organize camps and motivational talks for patients with diabetes mellitus that can change the behaviour and attitude of the patients and inculcate good self-care practices in them.

With this background our study aims to find out the proportion of patients following the diabetes self-care practices in terms of dietary modification, regular blood glucose testing, behaviour of exercise, and routine check-up at periodic intervals, knowledge regarding complications of diabetes mellitus and insulin self-administration.

## METHODS

This is a cross sectional questionnaire based study that was conducted at ESIC Medical College and Hospital, Faridabad, Haryana after obtaining institutional ethics committee approval. The study was conducted during the study period from July 2017 to September 2017 in the medicine department of the hospital after obtaining informed consents from all the study participants. Patients with type 2 diabetes mellitus who were attending diabetic clinic of the institution during the study period after fulfilling inclusion criteria were recruited. The questionnaire was pilot tested in a small group of ten patients to assess its reproducibility and suitability. Feedback was taken from these participants regarding their understanding with respect to the questionnaire. The Cronbach alpha was estimated to be 0.7, suggesting good internal consistency and an overall reliability.

A total of 136 patients were included in the study and interviewed by using a pre designed, pre tested, structured interview schedule which captured socio-demographic variables like age, sex, education, occupation, duration of diabetes, personal habits like smoking and drinking. The study questionnaire was adapted from the Diabetes Self-Management Questionnaire (DSMQ) covering different aspects of diabetes self-management like glucose management, dietary control, physical activities and health-care use. [6] Participants rate the extent to which each description applies to them on a four-point Likert scale (3 – 'applies to me very much' to 0 –'does not apply to me'), referring to the previous eight weeks. Individual responses from each domain of 16 point DSMQ are added up and transformed into compliance scores ranging from 0-48 so that higher scores indicate more desirable self-management behaviour. We had done reverse-scoring for the negatively-keyed items and summed up to compliance scores with ranges from 0 to 48. A score of 0-12 was considered as poor, 12-24 as fair, 25-36 as good and 37-48 as excellent self-care practice.

### STATISTICAL ANALYSIS

The data was analysed by the Statistical Package for Social Sciences (SPSS, version 20). The descriptive statistics are reported using frequencies and percentages. The test mean scores were compared across various socio-demographic and patient characteristics using ANOVA and student t test. A p value < 0.05 was considered to be statistical significant.

## RESULTS

A total 136 patients who met the inclusion criteria were included in the study. They were administered the questionnaire, among them 68 (50%) were males. Socio

demographic variables and clinical characteristics of the subjects included in the study are shown in table 1. Mean age of the participants was 44.53 with SD of 8.13 with 58.9% (80) subjects in the age group of 40-60 years. The mean duration of diabetes was 7.63 ± 6.49 years. In the pre-tested questionnaire the Cronbach alpha was estimated to be 0.7, suggesting good internal consistency and an overall reliability.

Most of the participants i.e. 58(42.6%) were educated up to high school and 36(26.5%) were illiterate. Out of the 136 subjects, 48(35.3%) were housewives and 8(5.9%), 44(32.4%), 36(26.5%) were working as skilled, semiskilled and unskilled workers respectively. Amongst the subjects participated in the study, only 6(4.4%) were recently diagnosed for diabetes mellitus, 66(48.5%) and 64(47.1%) were being on treatment for less than 5 years and more than 5 years respectively. On evaluation of the patients, of the 136 participants 90(66.2%) were non-smoker and 92(67.6%) were non-alcoholic.

Data regarding Diabetes Self-Management Questionnaire (DSMQ) scores are shown in table 2. In view of items regarding blood glucose measurement, none of the participants stated that they check their blood sugar levels regularly with care and attention. However, more than fifty present of the patients (69.1%) agrees that they do not skip or forget to take their diabetes medication and 80 (58.8%) patients stated that they take medications as prescribed by their physician. Most of the participants 84(61.8%) reported that they choose their food so as to make it easy to achieve optimal blood sugar levels. Only 30.9% (n=42) of the participants strongly deny that they occasionally eat lots of sweet or food rich in carbohydrate.

While assessing respondent's attitude towards physical activities, 63.2% (n=86) of the patients accepted that they did not go for regular exercises to maintain their blood sugar levels and 30 (20.1%) patients stated that they tend to skip their planned physical activity. Only 2(1.5%) patients strongly agreed that they keep all doctor appointments recommended for their diabetes treatment and 82(60.3%) participants accepted that they tend to avoid their diabetes appointments to some degree. More than half of the patients (66.2%) have a good compliance for their anti-diabetic medications. However, none of the participants were aware of the complications related to diabetes mellitus. Only 38.2% (n=52) of the respondents were some knowledge regarding practice of insulin self-administration barriers. To sum up when they were asked, whether they rate their diabetes self-care to be poor, very few number of the patients (n=14, 10.3%) applies it to them.

Subjective assessment of patients on four point Likert scale response has been used extensively to determine the level of diabetes self-care, with higher scores indicating the presence of excellent self-care and lower scores indicating poor self-care. The overall compliance score in our study participants was 23.44±4.17 (fair, range: 0-48)

The analysis showed that the compliance to the diabetes self-care decreased significantly (p<0.001) with an increase in age and it was lowest in the age group of >60 years. The mean compliance was also significantly lower among those who were illiterate (p<0.001) as compare to those who were educated up to PUC and above with a mean score of 25.57±1.99 as shown in table 3. The mean compliance score was decreased significantly (p=0.02) from higher level of skilled occupation to unskilled and homemakers.

## Table 1. Socio demographic variables and patient characteristics

|   | Variable | Category | Male (%) | Female (%) |
|---|---|---|---|---|
| 1 | Age(in years) | 20-40 | 16(11.7) | 38(27.9) |
|   |  | 41-60 | 50(36.8) | 30(22.1) |
|   |  | >60 | 2(1.5) | 0(0) |
|   |  |  | Frequency | Percentage |
| 2 | Education | Illiterate | 36 | 26.5 |
|   |  | Up to High School | 58 | 42.6 |
|   |  | PUC and above | 42 | 30.9 |
| 3 | Occupation | Skilled | 8 | 5.9 |
|   |  | Semiskilled | 44 | 32.4 |
|   |  | Unskilled | 36 | 26.5 |
|   |  | Retired | 0 | 0.0 |
|   |  | Housewife | 48 | 35.3 |
| 4 | Habits | Smoker | 46 | 33.8 |
|   |  | Non-smoker | 90 | 66.2 |
|   |  | Alcoholic | 44 | 32.4 |
|   |  | Non-alcoholic | 92 | 67.6 |
| 5 | Duration of Diabetes | < 1 year | 6 | 4.4 |
|   |  | 1-5 years | 66 | 48.5 |
|   |  | >5 years | 64 | 47.1 |

reportedly been seen. A cardinal attribute of healthcare quality is adherence to prescribed medications, it is very crucial for improving clinical outcomes in patients with chronic diseases like diabetes mellitus. The main upshot of non-compliance to anti diabetic drugs is decreased glycaemic control, which can lead to treatment failures and accelerated development of various diabetes-related complications. Present study is the first of its kind in ESI institution to explore the compliance of diabetic patients to their standard treatment and association of various socio-demographic factors and patient characteristics with the compliance scores.

Self-care practices are key components of diabetic care and aid in good diabetic control with reduced incidence of micro and macro vascular complications.[9-11] In the present study we observed that most of the patients do not get their blood glucose levels checked regularly, however sixty nine per cent of the patients did not skip their daily medication. This is in contrast to a previous study in a rural area of Bangalore in which patients underwent regular blood sugar testing.[12]

A meta-analysis of self-management education for adults with type 2 diabetes reported that self-management

### Table 2. Diabetes Self-Management Questionnaire (DSMQ)

| The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks. | Applies to me very much | Applies to me at a considerable degree | Applies to me some degree | Does not apply to me |
|---|---|---|---|---|
| 1. I check my blood sugar levels with care and attention | 0(0) | 38(27.9) | 64(47.1) | 34(25) |
| 2. The food I choose to eat makes it easy to achieve optimal blood sugar levels | 18(13.2) | 84(61.8) | 34(25) | 0(0) |
| 3. I keep all doctor appointments recommended for my diabetes treatment | 2(1.5) | 36(26.5) | 64(47.1) | 34(25) |
| 4. I take my diabetes medication as prescribed | 22(16.2) | 80(58.8) | 34(25) | 0(0) |
| 5. Occasionally I eat a lot of sweets or other food rich in carbohydrate | 0(0) | 30(22.1) | 64(47.1) | 42(30.9) |
| 6. I record my blood sugar level regularly | 0(0) | 10(7.4) | 68(50) | 58(42.6) |
| 7. I tend to avoid diabetes related appointments | 0(0) | 50(36.8) | 82(60.3) | 4(2.9) |
| 8. I do regular physical activity to attain blood sugar level regularly | 0(0) | 20(14.7) | 30(22.1) | 86(63.2) |
| 9. I strictly follow the dietary recommendations given by the doctor | 42(30.9) | 38(27.9) | 56(41.2) | 0(0) |
| 10. I tend to forget to take or ski my diabetes medication | 0(0) | 6(4.4) | 36(26.5) | 94(69.1) |
| 11. Regarding my diabetes care, I should see my medical practitioner more often | 24(17.6) | 50(36.8) | 22(16.2) | 40(29.4) |
| 12. I tend to skip my planned physical activity | 30(20.1) | 48(35.3) | 54(39.7) | 4(2.9) |
| 13. My diabetes self-care is poor | 14(10.3) | 8(5.9) | 110(80.9) | 4(2.9) |
| 14. Compliance to my antidiabetic drugs | 90(66.2) | 38(27.9) | 8(5.9) | 0(0) |
| 15. Knowledge about practice of insulin self-administration barriers if any medication adherence | 0(0) | 52(38.2) | 74(54.4) | 10(7.4) |
| 16. Knowledge on complications of diabetes | 0(0) | 0(0) | 32(23.5) | 102(75) |

It was also significantly lower among those participants who were on medications for diabetes mellitus for more than 5 years (p<0.01) which indicates a lower compliance to diabetes self-care with increasing duration of illness. But our study did not able to find any significant association between personal habits of smoking as well as with alcohol consumption.

## DISCUSSION

The global rise in the prevalence of diabetes mellitus has become a challenging health care problem.[7] Around the globe diabetes prevalence predict approximately 6.4%, affecting 285 million adults in 2010, and will increase to 7.7% and 439 million adults by 2030.[8] A wide variation in compliance to management of diabetes mellitus has

education improves glycaemic control at immediate follow up.[13] Self-management in Diabetes Mellitus is considered as an essential cornerstone of good diabetes control.[14] It requires the patient to make many dietary changes and lifestyle modifications supplemented with supportive role of healthcare staff for maintaining a higher level of self-confidence leading to successful behavioural change.

In our study a significant number of patients (63.2%) reported to avoid physical activity. However they (61.6%) were aware that foods with high glycaemic index should be avoided in the diet although they were not getting any advice about diabetic diet from the doctor. Studies carried out by Padma et al, Gopichandran et al observed that only 45.9% of the study participants followed a diabetic diet plan as advised by their doctor and only one fourth of the patients included

vegetables and fruits in their diet all days of week.[15,16] In another set of studies carried out by Hailu et al and Gopichandran et al it has been observed that daily physical activity was around 10-20%.[16,17] Treating physicians should advice and recommend diabetes patients to undertake regular exercises and walking as engaging in physical activity has beneficial effects and better blood glucose control.

### Table 3: Distribution of mean compliance scores across different Socio-Demographic and Patient Characteristics.

| Socio-Demographic and Patient Characteristics | Mean ± SD | P value |
|---|---|---|
| Age (Years) | | |
| 20-40 (n=54) | 25.06±2.53 | |
| 41-60 (n=80) | 22.54±4.63 | P<0.001 |
| >60 (n=2) | 16.00±0.00 | |
| Education | | |
| Illiterate (n=36) | 20.14±4.76 | |
| Up to High School (n=58) | 23.95±3.73 | P<0.001 |
| PUC and above (n=42) | 25.57±1.99 | |
| Occupation | | |
| Skilled (n=8) | 25.75±1.16 | |
| Semiskilled (n=44) | 24.66±2.91 | |
| Unskilled (n=36) | 22.31±5.48 | P=0.02 |
| Housewife (n=48) | 22.79±3.99 | |
| Habits | | |
| Smoker (n=46) | 22.96±4.65 | |
| Non-smoker (n=90) | 23.69±3.91 | P=0.34 |
| Alcoholic (n=44) | 23.05±4.35 | P=0.45 |
| Non-alcoholic (n=92) | 23.63±4.09 | |
| Duration of Diabetes | | |
| <1years (n=6) | 25.00±0.89 | |
| 1-5 years (n=66) | 24.59±3.28 | P<0.01 |
| >5years (n=64) | 23.44±4.76 | |

In addition to compliance and self-care, knowledge about complications to diabetes is equally important. In our study patients were unaware regarding the long term harmful effects of chronic diabetes. We also assessed the knowledge of Insulin self-administration in our study population. The findings showed inadequate knowledge and practice of Insulin self-administration in our study participants. Earlier studies have also shown that diabetic patients had poor level of knowledge of Insulin self-administration and were not aware of complications of insulin and its management. [18]

As regards the correlation of self-care practices with socio-demographic characteristics, it was found that diabetes self-care was significantly lower among those who were illiterate or unskilled workers. It has been documented that among people with Type 2 diabetes mellitus, knowledge deficit and understanding about diabetes and its complications have been found to be low in those with low health literacy. [19]

Analysis on likert scale also showed that self-care decreases with increasing age and duration of diabetes mellitus. This is in consistence to a similar study conducted by Shuvankar Mukherjee et al among patients with type 2 diabetes

mellitus.[20] Another recent study conducted in a large population among patients with type 2 diabetes in Europe on overall medication adherence including anti-diabetic drugs stated that factors including age, and existing diabetes complications were associated with poor medication adherence.[3]

It is believed that patients knowledge of self-care practices and diabetes complications is the key to achieving therapeutic goals in ambulatory care. The short comings identified in the self-care practices among patients with diabetes mellitus suggest a critical need to develop and integrate self-care education programs at the level of community. Physicians should be involved in the whole process of planning, implementation, and evaluation of the program. The program should concentrate particularly on areas like dietary habits, glucose management and physical activity. The patients should be made aware and a sense of responsibility should be nurtured in them regarding the importance of self-care practices.

## CONCLUSION

It can be concluded from the present study, that the compliance score to be not good among the participated patients. Our study provides an insight into the importance of medication adherence and compliance in the management of patients with diabetes mellitus. A good knowledge of complications of diabetes mellitus and positive attitude towards self-care practices would assist in better clinical outcome in patients with diabetes.

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