



A Prospective Descriptive Study to Assess the Medication Adherence using Morisky Medication Adherence Scale in Type II Diabetes Mellitus Patients

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ABSTRACT

A self-reporting questionnaire is the most convenient and easiest way to assess the medication adherence. A new 14-item self-reported Morisky Medication Adherence Scale [MMAS] has shown better results than the original 4-item Morisky scale. The data were derived from a prospective descriptive study, a convenience sample of 120 Type 2 diabetic inpatients were identified at the Tertiary Hospital, Tamil Nadu between May and October, 2022. Approximately 95% (115) of the patient who were approached agreed to participate. Face to face interview which includes asking the questions regarding medication adherence MMAS and collection of socio-demographic data. We conclude that the 14-item MMAS is a high valid and reliable questionnaire to screen medication adherence in type 2 diabetes mellitus patients. Measuring adherence to diabetes mellitus patients is the first step in identifying and improving adherence. Non-adherence is a major factor that could lead to morbidity and mortality in diabetic patients. These findings suggest that the MMAS is a reliable and valid measure of self-reported medication adherence.

Keywords: Diabetes, Morisky Medication Adherence Scale [MMAS], Adherence, Question.

INTRODUCTION

Diabetes Mellitus

Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both. Insulin deficiency in turn leads to chronic hyperglycaemia with disturbances of carbohydrate, fat, and protein metabolism¹.

- Type 1 diabetes mellitus (T1DM) is an autoimmune disease that leads to the destruction of insulin-producing pancreatic beta cells. Insulin is an essential anabolic hormone that exerts multiple effects on glucose, lipid, protein, and mineral metabolism, as well as growth^{2,3}.
- In Type 2 diabetes mellitus (T2DM), the response to insulin is diminished, and this is defined as insulin resistance. During this state, insulin is ineffective and is initially countered by an increase in insulin production to maintain glucose homeostasis, but over time, insulin production decreases, resulting in T2DM^{4,5}.

Medication Adherence

- Medication adherence usually refers to whether patients take their medications as prescribed (e.g., twice daily), as well as whether they continue to take a prescribed medication. Medication nonadherence is a growing concern to clinicians, healthcare systems, and other stakeholders (e.g., payers) because of mounting evidence that it is prevalent and associated with adverse outcomes and higher costs of care^{6,7}.

METHODS

In this study, a convenience sample of 120 Type 2 diabetic inpatients were identified at the Tertiary Hospital, Tamil Nadu between May and October, 2022. Approximately 95% (115) of the patient who were approached agreed to participate. Patients who were eligible for the study were at least 18 years old and who were under Anti-diabetic therapy. Patients who were mentally ill and who were pregnant were excluded. Face to face interview which includes asking the questions regarding medication adherence and collection of socio-demographic data. While the patients were interviewed on adherence, they were asked to think about all medications used. Nevertheless, since all were diagnosed with diabetes, were at least one hypoglycemic drugs, and were interviewed at the Tertiary Hospital, they often referred to hypoglycemic drugs more than to other drug groups. On the same day of the interviews, medical records were reviewed.

Morisky Medication Adherence Scale

The MMAS was developed from the previous four item Morisky Medication Adherence Scale and supplemented with additional items⁴. The theory underlying this measure was that failure to adhere to a medication regimen can be caused by many factors, such as, "Did you forget to carry your medication, when you step out from home for travel?", "Have you ever stopped taking your medication without consulting your doctor?" and problems with the complexity of the medical regimens, such as, "Do you ever felt frustrated or inconvenient about taking medications daily?". Each item of the MMAS items is measuring a specific behavior and is not a determinant of adherence behavior⁷. Response choices are yes/no for items 1-7 and



a 5-point Likert response for the items 8-14. Scores obtained from this scale range from 0 to 14, where higher scores indicate higher adherence. Scores of 14, 11 to less than 14, and less than 11 were classified as high, medium and low adherence, respectively.

For this study, the 14 items MMAS was translated into Tamil using bilingual people. A pilot test (N=25) was done to ensure patient understanding of the wording of the Tamil version of the MMAS questionnaire. The characteristics of the whole sample and adherent groups including high, medium, low adherence groups were presented.

Study Criteria

Inclusion Criteria

- Patients admitted in the hospital with diabetes and co-morbidities.
- Diabetic patients of both genders.
- Patients who are under anti-diabetic therapy.
- Patients who are willing to cooperate.
- Interested in providing informed consent.

Exclusion Criteria

- Patients with pregnancy (Gestational diabetes).
- Patients who are not willing to participate or cooperate in the study.
- Patients who are mentally ill.

Statistical Outcome

Data were collected and analysed using Microsoft Excel.

RESULTS AND DISCUSSION

Patient Characteristics

A total of 115 patients were enrolled in the study. Out of 115, males were 44 (38%) and females were 71 (62%) (as shown in table 1). Majority of the patients were in the age group of 20 to 40 years -24 people (21%), followed by 41 to 60 years -65 people (56%) and above 60 years-26 people (23%) (as shown in table 2). In male patients, 18 was obese (41%) and 26 were non-obese (59%). Patients whose diabetes duration was less than 5 years- 47 people (40.8%), 6 to 10 years -33 people (28.6%), 11 to 20 years-16 people (13.9%) and above 20 years -19 people (16.5%) (as shown in the table 3). In male patients, less than 5 years -21 people(47.7%), 6 to 10 years -10 people(22.7%), 10 to 20 years -9 people(20.4%) and above 20 years-4 people(9%). In female patients, less than 5 years -26 people(36.6%), 6 to 10 years-23 people(32.3%), 10 to 20 years -14 people (19.7%) and above 20 years -8 people(11.2%) (as shown in the table 4). Out of 44 male patients, 34 people were taking OHA drugs (77.2%), 3 people were taking insulin(6.8%), 7 people were taking OHA+insulin (15.9%) (as shown in table 5). Out of 71 female patients, 62 people were taking OHA drugs (87.3%),

4 people were taking insulin (5.6%) and 5 people were taking OHA+insulin (7%) (as shown in the table 6).

In the age group of 20 to 40 years, 22 people were taking OHA drugs (91.6%), 2 people were taking insulin (8.3%), 1 person was taking OHA + insulin (1.4%). In the age group of 41-60 years, 56 people were taking OHA drugs (86.1%), 2 people were taking insulin (3.07%), 6 people were taking OHA + Insulin (19.2%). In the age groups of above 60 years, 18 people were taking OHA drugs (69.2%), 3 people were taking insulin (11.5%), 5 people were taking OHA + insulin (19.2%) (as shown in table 7). 37 people were taking 1 OHA drugs (32.6%), 41 people were taking 2 OHA drugs (35.6%), 18 people were taking 3 OHA drugs (15.6%), 7 people were taking insulin (6.08%), 1 person was taking 1 OHA +insulin (0.8%), 9 people were taking 2 OHA + insulin (7.8%), 2 people were taking 3 OHA + insulin (1.7%) (as shown in table 8).

Assessment of Medication Adherence

Medication adherence were assessed by using MMAS (Morisky Medication Adherence Scale). Out of 115 patients, 4 patients were assessed to have high adherence, 37 patients were assessed to have medium adherence and 74 patients were assessed to have low adherence. In patients aged above 50 years, 2 patients were assessed to have high adherence, 23 patients were assessed to have medium adherence, 31 patients were assessed to have low adherence.

In patients aged 50 years and below 50 years, 2 patients were assessed to have high adherence, 14 patients were assessed to have medium adherence, 43 patients were assessed to have low adherence. Out of 115 patients, 50% of male patients were assessed to have high adherence and 50% of female patients were assessed to have high adherence, 46% of male patients were assessed to have medium adherence and 54 % of female patients were assessed to have medium adherence, 38% of male patients were assessed to have low adherence, 62% of female patients were assessed to have low adherence.

The patients were classified on the basis of duration of Type 2 diabetes mellitus into ≤ 5 years, $\geq 6 \leq 10$ years, $\geq 11 \leq 20$ years and > 20 years, 32%, 22%, 30%, 16% were assessed to have medium adherence and 45%, 31%, 16%, 8% were assessed to have low adherence respectively. The patients were classified on the basis of duration of T2DM in to ≤ 5 years and $\geq 6 \leq 10$ years, 50% and 50% were assessed to have high adherence respectively.

The patients were classified on basis of anti-diabetic therapy into 1 Oral hypoglycemic agent (OHA), 2 Oral hypoglycemic agents, 3 Oral hypoglycemic agents, Insulin, 1 OHA + Insulin, 2 OHA + Insulin and 3 OHA + Insulin, 42%, 30 %,14%,5%,1%,7%,1% were assessed to have low adherence respectively. 1 Oral hypoglycemic agent, 2 Oral hypoglycemic agents, 2 OHA + Insulin, 50%, 25%, 25% were assessed to have high adherence respectively. 1 Oral hypoglycemic agents, 2 Oral hypoglycemic agents, 3 Oral hypoglycemic agents, Insulin, 2 OHA + Insulin and 3 OHA +



Insulin, 11%, 49%,21%,8%,8%,2% were assessed to have medium adherence respectively.

Table 1: Gender Wise Classification

Gender	No of patient [n = 115]	Percentage %
Male	44	38
Female	71	62

Table 2: Age Wise Classification

Age	No of patient [n = 50]	Percentage %
20-40 years	24	21
41– 60 years	65	56
Above 60 years	26	23

Table 3: Duration of Diabetes

Duration	No of patient [n = 50]	Percentage %
Less than 5	47	40.8
6 – 10 years	33	28.6
11-20 years	16	13.9
Above 20 years	19	16.5

Table 4: Age Wise Diabetes Duration

Gender	Less than 5 years	Percentage %	6 – 10 years	Percentage %	10- 20 years	Percentage %	Above 20 years	Percentage %
Male	21	47.7	10	22.7	9	20.4	4	9
Female	26	36.6	23	32.3	14	19.7	8	11.2

Table 5: Gender Wise Drug Prescribed

Gender	OHA	Percentage %	Insulin	Percentage %	Oha+ insulin	Percentage %
Male	34	77.2	3	6.8	7	15.9
Female	62	87.3	4	5.6	5	7

Table 6: Age Wise Drug Prescribed

Age	OHA	Percentage %	Insulin	Percentage %	OHA + insulin	Percentage %
20 – 40 years	22	91.6	2	8.3	1	4.1
41-60 years	56	86.1	2	3.07	6	9.2
Above 60 years	18	69.2	3	11.5	5	19.2

Table 8: Characteristics of Type 2 Diabetes Patients

Characteristics	Total sample (n = 115)	High Adherence (MMAS = 14) (n=4)	Medium Adherence 11< MMAS <1 (n=37)	Low Adherence (MMAS≤10) (n=74)	
Age (Mean ± SD)	51.86 ±12.49	53.5 ± 14.27	55.40 ± 13.52	50 ± 11.62	
Gender count %	Male	44	50	46	34
	Female	71	50	54	66
Gender %	Male	38	50	46	38
	Female	62	50	54	62
Duration of diabetes (%)	≤ 5 years	40	50	32	45
	≥ 6 ≤10 years	28	50	22	31
	≥11≤20 years	14	-	30	16
	>20 years	16	-	16	8
Type of oral hypoglycemic agent (%)	1 OHA	32	50	11	42
	2 OHA	35	25	49	30
	3 OHA	15	-	21	14
	Insulin	7	-	8	5
	1 OHA +Insulin	0.8	-	-	1
	2 OHA + Insulin	8	25	8	7
	3 OHA + Insulin	2	-	2	1
MMAS (Mean ± SD)	8.13±3.15	14.00±0.00	11.78±0.78	8.13±3.15	
Range	0-14	14.00-14.00	11.00-13.00	0-10	



Table 7: Drugs Distribution

Drugs	Frequency	Percentage %
1 OHA	37	32.1
2 OHA	41	35.6
3 OHA	18	15.6
INSULIN	7	6.08
1 OHA + INSULIN	1	0.8
2 OHA + INSULIN	9	7.8
3 OHA + INSULIN	2	1.7

CONCLUSION

This study aimed to assess the Medication adherence of patients with T2DM. We concludes that the 14-item MMAS is a high valid and reliable questionnaire to screen medication adherence in type 2 diabetes mellitus patients. Measuring adherence to diabetes mellitus patients is the first step in identifying and improving adherence. Non-adherence is a major factor that could lead to morbidity and mortality in diabetic patients.

These findings suggest that the MMAS is a reliable and valid measure of self-reported medication adherence. Only 32.1% of the subjects adhered to anti-diabetic medications. Remaining 67.9% of the subjects non-adhered to anti-diabetic medications. While the current prescribing strategy achieved glycaemic control for less than half of the patients, majority are still not meeting the recommended blood glucose target. This appears mainly due to poor adherence with prescribed drug regimen and poor knowledge and practice of self-management behaviors. There is a need for regular appraisal of drug prescribing and better monitoring of patient adherence with prescribed anti diabetic drugs and other diabetes self-management practices. Family support played a vital role in medication adherence among the diabetic subjects. Hence, it is important to regularly assess patients for medication adherence and include their families also in counseling sessions.

However, having good knowledge about the disease does not guarantee adherence to medication regimen. It is very important to identify the potential local barriers to medication adherence and further digging into the matter is required, moreover prescribers need to raise this issue with their patients during their appointments, customize the treatment regimen and build a strong relationship with the patients⁸. The employment of pharmacists as disease educators is essential for creating awareness about the issue and its consequences.

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