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Assessment of Pharmaceutical Care Services in Diabetes Mellitus Patients in a Tertiary Care Teaching Hospital



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ABSTRACT

Background: Pharmaceutical care plays an important role in reducing mortality and morbidities of the patients. Diabetes is a disease that desperately needs more clinical pharmacist involvement. Pharmaceutical care and expanded role of clinical pharmacists are associated with many positives diabetes related outcomes including Quality Of Life (QOL), Knowledge Attitude and Practice (KAP), and Medication Adherence. **Objectives:** The aim of this study is to assess the Pharmaceutical care services in Diabetes Mellitus (DM) patients and to measure QOL, Medication Adherence and KAP at different follow-up by provide patient counselling and patient educating services so as to improve control of DM. **Methodology:** A prospective study was conducted with 120 patients among them 96 males and 24 females type2 DM adult patients in a tertiary care teaching hospital. After obtaining consent from participants QOL, Medication adherence and KAP were assessed by a validated pre structured interviewer- administered questionnaires (Kannada translated). The results were evaluated as average score as well as the level of QOL, Medication adherence, and KAP. **Results:** A total of 120 Type 2 Diabetes Mellitus patients were enrolled in which males 96(80.00%) and females 24(20.00%). The highest number of type2 DM seen in the age group 60-70 (42) (35.00%). Both (Alcoholic & Smoker) 48 (40.00%) were highly prone to type2 DM. Hypertension (HTN) 75 (62.50%) were more common in type2 DM patients as compare to other co-morbidities. The patients were found with GRBS (General Random Blood Sugar) level at baseline 246.25 and ± 93.29 , 1st Follow-up 170.29 and ± 71.12 , 2nd Follow-up 135.71 and ± 35.50 , and 3rd Follow-up 175.00 and ± 35.35 with Mean and Standard deviation respectively. QOL measurement at Baseline 47.66 and ± 12.75 , 1st Follow-up 77.14 and ± 07.10 , 2nd Follow-up 77.14 and ± 07.10 , and 3rd Follow-up 80.00 and ± 00.00 with Mean and Standard deviation respectively. KAP measurement at Baseline >02.00 and ± 00.00 , 1st Follow-up 00.98 and ± 00.14 , 2nd Follow-up 00.51 and ± 00.50 , and 3rd Follow-up 01.00 and ± 00.00 with Mean and Standard deviation respectively. Medication Adherence measurement at Baseline 01.99 and ± 00.09 , 1st Follow-up 00.76 and ± 00.42 , 2nd Follow-up 00.40 and ± 00.49 , and 3rd Follow-up 01.00 and ± 00.00 with Mean and Standard deviation respectively. **Conclusion:** The study concluded that clinical pharmacist mediated pharmaceutical care improved QOL, KAP, and Medication Adherence.



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INTRODUCTION

According to the World Health Organization (WHO) estimate, the global burden of diabetes has increased from 177 million people in the year 2000 to 194 million in 2003 and further to 246 million people in 2007. In 2009 the International Diabetes Federation (IDF) suggested that the number of adults with diabetes in the world would expand by 54%, from 284.6 million in 2010 to 438.4 million in 2030.¹

Between the years 1995 and 2025, the adult population will increase by 64%, prevalence of diabetes in adults will increase by 35%, and the number of people with diabetes will increase by 122%. For the developed countries, there will be an 11% increase in the adult population, a 27% increase in the prevalence of adult diabetes, and a 42% increase in the number of people with diabetes. For the developing countries, there will be an 82% increase in the adult population, a 48% increase in the prevalence of adult diabetes, and a 70% increase in the number of people with diabetes. The global prevalence of diabetes among adults is high, varying between 2.8 percent to 4 percent in the year 2000. This number is expected to grow, resulting in over 350 million persons with diabetes worldwide in 2030.^{2,3}

The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The most important demographic change to diabetes prevalence across the world appears to be the increase in the proportion of people >65 years of age.³

DM is the second most common cause of mortality worldwide. Until recently, India had more diabetics than any other country in the world, according to the International Diabetes Foundation; the average age on onset is 42.5 years. Every year nearly one million Indians die due to diabetes. A study by the American Diabetes Association (ADA) reports that India will see the greatest increase in people diagnosed with diabetes by 2030.⁴

It is predicted that by 2030 DM may afflict up to 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will also see significant increases in those affected by the disease.⁵

Pharmaceutical care interventions have shown that clinical pharmacists can have a significant impact on patient outcomes. International and national guidelines encourage clinical pharmacists to take an active interest in care for diabetic patients. Long-term complications

include retinopathy, nephropathy, and neuropathy. The long-term complications of diabetes are associated with high morbidity, high cost, and decrease in quality of life.⁶

By 2025 India will be dubbed as the 'DIABETIC CAPITAL OF THE WORLD'. According to recent WHO estimates presently India has 32 million diabetic subjects, and this is projected to increase to 100 million by 2035. Currently, 1 in 12 people are diabetic in India. The countries with the largest number of diabetic people will be India, China and USA by 2030. The studies in Indian population showed that major risk factor for high prevalence of type2 DM are genetic disposition, insulin resistance, obesity, central obesity (greater abdominal adiposity), urbanization with change in diet habits like fast food culture and sedentary lifestyle. Therefore, this research aimed to evaluate the role of Pharmaceutical care on the QOL in patients with type2 DM in our medical setting.⁷

Pharmaceutical care (PC) represents a frontier in disease state management. It is patient oriented and empowers patients to actively participate in their treatment process. It improves patients outcomes, reduce cost and promotes patient's quality of life. It's a cooperative, patient- centered system for achieving specific positive patient outcomes from the responsible provision of medicines. To achieve the outcomes, pharmacists cooperate with patients and with the other members of the healthcare team aimed at preventing or resolving Drug Therapy Problems (DTPs). Pharmacists identify Drug Therapy Problems, resolve actual Drug Therapy Problems and prevent potential Drug Therapy Problems through Pharmaceutical care practices. Drug Therapy Problems pose are significant challenges to health care providers that are associated with morbidity, mortality, and patient's QOL. Patients with type 2 DM receive a wide range of pharmacotherapeutic agents and are therefore at higher risk to experience Drug Therapy Problems. The UK, the Netherlands, Sweden, Portugal and Nordic countries had a long tradition of Pharmaceutical care while in other European countries like the Central and Eastern European countries, the practice is not as developed as in Western Europe. Pharmaceutical care is a philosophy and practice in which the patient is the main beneficiary of the pharmacist's efforts. The pharmacist focuses his attitude, behaviour, commitment, ideas, knowledge, responsibilities, and skills on the provision of drug therapy. The steps in providing Pharmaceutical care include establishing a professional/therapeutic relationship. Pharmaceutical care is a collection of patient-specific subjective and objective, data sources of patient, data include patient interview (PI), interview of other caregivers and patient's relatives, medical records review, laboratory report and physical assessment. The

need for Pharmaceutical care is invaluable especially in chronic disease management where compromise in management results in loss of resources, complications, disabilities, and death. Embracing this trend promptly will be invaluable to developing countries with high level of poverty and limited resource allocation to healthcare.⁸

Pharmacists are in an ideal position to provide patient education and monitor and promote adherence to self-care and therapeutic regimens, which have a positive impact on achieving therapeutic outcomes in diabetes. In addition, because of their extended scientific and technical knowledge, pharmacists are especially alerted to certain aspects, such as the occurrence of adverse drug reactions and interactions, and specific features associated with aging and co-morbidities. Pharmacists can also contribute positively to diabetes management by providing Pharmaceutical care programs, which involve working closely with the patient and other health care professionals in designing, implementing, and monitoring therapeutic plans to achieve specific outcomes that will improve patient quality of life. Pharmacists can also serve as a “bridge” between the patients and these health care professionals, thereby ensuring continuity of care, which is essential in the management of chronic diseases such as diabetes.⁹

Objectives of the study

To assess the Pharmaceutical care service's impact on QOL, Medication Adherence and KAP in DM patients. To provide patient counselling and the effectiveness of Pharmaceutical care to improve control of DM, and also to identify drug related problems.

MATERIAL AND METHODS:

Study site:

The study was conducted at Department of Clinical Pharmacy, CSI Holds-worth Memorial (Mission) Hospital, Mysore- Karnataka. It is a 300 bedded tertiary care teaching hospital having different specialities like General medicine, General Surgery, OBG, Dermatology, Urology, Dental, Physiotherapy, ENT, Paediatrics.

Study design:

This was a Prospective Cohort Study.

Study approval:

The approval was obtained from The Institutional Ethics Committee (IEC) of Farooqia College of Pharmacy, Mysore. Informed written consent was submitted along with protocol.

Study period:

This study was conducted for a period of 6 months from November 2018 – April 2019.

Study criteria:

INCLUSION CRITERIA: Admitted patients and diagnosed with type 2 DM and patients willing to participate in the study. Adult patients of either gender are selected. Patients having good orientation and ability to communicate verbally were also included.

EXCLUSION CRITERIA: Pregnant and lactating women. Complicated patients, bedridden patients and mentally unstable patients were excluded from the study.

Number of Patients Enrolled: The total number of patients enrolled for this study was 120.

Sources of Data: All necessary data was collected from the following sources.

- Patient case history.
- Patient prescriptions.
- Personal interview with Doctors, Nurses, Patient and Patient caretakers.

Study Materials:

- Patient Data Collection Form (PDCF)
- Questionnaires
- ✓ QOL in English and Kannada
- ✓ Medication Adherence in English and Kannada
- ✓ KAP in English and Kannada
- Patient Informed Consent Form (PICF) in English and Kannada

➤ Patient Information Leaflet (PIL) in English and Kannada

Study Procedure: Diabetic patients enrolled into study by considering inclusion and exclusion criteria. A well designed PDCF was used for collecting the details of patients enrolled. At baseline demographic details, QOL, Medication Adherence, and KAP questionnaires was applied and collected. Subsequent follow-up done by applying of QOL, Medication Adherence and KAP questionnaires before and after patient counselling at different follow up. QOL, Medication Adherence and KAP scores were calculated at baseline and at each follow-up. All the enrolled patients were counselled about the disease, their medication and lifestyle modifications after the application of questionnaires. Pharmaceutical care services include ADRs, DDIs were also identified. Suitable statistical test was applied for the selected data to find significant differences between and within variables.

Study Questionnaires: Through review of literature and advice from the advisors of relevant fields, were used for constructing of constructing the questionnaires. Important domains relevant to QOL, Medication Adherence, and KAP were recognized after an extensive review of similar questionnaires used in other settings. The QOL questionnaire was prepared based on the requirements. The QOL questionnaire contains of two part, first part is named as “How satisfied are you with” which contains 14 questions and second part is named as “How important to you is” which contains 16 questions. Each question in QOL is divided into six categories- very dissatisfied, moderately dissatisfied, slightly dissatisfied, slightly satisfied, moderately satisfied, and very satisfied rating from 1 to 6 respectively. The sum of total number of rating is divided with 180 (highest number of rating multiplied with total number of questions (i.e. 6×30) and the result is multiplied with 100 to get the final result in percentage. Result is then placed as 00% (below or equal to 0%) very dissatisfied, 20% (above 0% up to 20%) moderately dissatisfied, 40% (above 20% up to 40%) slightly dissatisfied, 60% (above 40% up to 60%) slightly satisfied, 80% (above 60% up to 80%) moderately satisfied, 100% (above 80% up to 100%) very satisfied. The Medication Adherence questionnaire was taken and scoring was done as per Morisky 8-items medication adherence questionnaire 1986. But in our study, two more questions were added based on the requirements. The KAP questionnaire was prepared based on the requirements. The questionnaire contains of three parts such as Knowledge, Attitude and practice. The knowledge contains seven questions with yes and no option in each, scoring is taken as zero for yes and one for no. The attitude contains six questions with yes and no option in each.

The practice contains ten questions with yes and no option in each. For both attitude and practice the scoring is done as if the answer is in favour of counsellor it score is taken as zero and out of favour to counsellor, the score is taken as one. Finally, the score is divided with total number of questions in KAP to get the average. Scores >2 = low KAP, 1 or 2= Medium KAP, 0= High KAP.

Statistical Methods: Descriptive statistical methods like Mean, Standard Deviation and Percentage were used in this study. Microsoft Excel and Google form were used to generate graphs, tables etc.

RESULTS:

A total of 120 Type 2 DM patients were enrolled in which males 6 (80.00%) and females 24 (20.00%) with Standard deviation of ± 36.00 (Table No. 01).

Demographic details of enrolled patients (n=120)

Age: The number of patients falls under the age group 20-30 years 04 (03.33%), followed by 30-40 years 12 (10.00%), 40-50 years 16 (13.33%), 50-60 years 17 (14.17%), 60-70 years 42 (35.00%), 70-80 years 19 (15.83%), 80-90 years 10 (08.33%) with Standard deviation ± 15.33 respectively (Table No. 01).

BMI: The number of patients with BMI <18.5 were 00, 18.5-24.9 were 04 (03.33%), 25.0-29.9 were 57 (47.50%), 30.0-34.9 were 50 (41.67%), 35.0-39.9 were 09 (07.50%) and ≥ 40.0 were 00, with Standard deviation ± 03.54 (Table No. 01).

Blood Group: The number of patients with the Blood Group A+31(25.83%), A-8(6.67%), B+35 (29.17%), B-5(4.17%), O+ 25(20.83%), O- 5(4.17%), AB+ 13(10.83%), and with AB-1(0.83%) with Standard deviation ± 12.26 respectively (Table No. 01).

Social History: There were 14 (11.67%) Alcoholic, 3 (02.50%) Smoker, 48 (40.00%) Both Alcoholic & Smoker, 01 (00.83%) Ex-smoker, 03 (02.50%) Ex-Alcoholic, 18 (15.00%) Ex-Alcoholic & Ex-Smoker, and 33 (27.50%) Non-Alcoholic and Smoker patients with Standard Deviation ± 16.36 (Table No. 01).

Family History: There were 117 (97.50%) Married, and 3 (2.50%) Unmarried patients with Standard deviation ± 57.00 (Table No. 01).

Past Medical History: Patients with Hypertension (HTN) 75 (62.50%), IHD 17 (14.17%), CKD 19 (15.83%), COPD 14 (11.67%), Liver disease 3 (02.50%), TB 5 (04.17%), Asthma 01 (00.83%), Bronchitis 03 (02.50%) and Hypothyroidism 3 (2.50%), with Standard deviation ± 21.97 respectively (Table No. 01).

Laboratory Findings:

Haemoglobin count (Hb) gm/dl

➤ The range of Hb from 06-08 gm/dl were found 02 (01.67%) patients, 08-10 gm/dl 24 (20.00%) patients, 10-12 gm/dl 29 (24.17%) patients, 12-14 gm/dl 44 (36.67%) patients, 14-16 gm/dl 17 (14.17%) patients, 16-18 gm/dl 03 (02.50%) patients, and 18-20 gm/dl 01 (00.83%) patients were found with Mean and Standard deviation 11.05 and ± 02.27 respectively (Table No. 02).

HbA1C

➤ The range of HbA1C from 04-06% were found 08 (06.67%) patients, 06-08 % 41 (34.17%) patients, 08-10 % 37 (30.83%) patients, 10-12 % 27 (22.50%) patients, and 12-14 % 07 (05.83%) patients were found with Mean and Standard deviation 07.73 and ± 02.05 respectively (Table No. 02).

GRBS (mg/dl)

➤ The patients were found at Baseline of GRBS level from the range 100-150 (mg/dl) 05 (04.16%), 150-200 (mg/dl) 24 (20.00%), 200-250 (mg/dl) 26 (21.66%), 250-300 (mg/dl) 26 (21.66%), 300-350 (mg/dl) 23 (19.16%), 350-400 (mg/dl) 04 (03.33%), 400-450 (mg/dl) 04 (03.33%), 450-500 (mg/dl) 03 (02.50%), and 500-550 (mg/dl) 05 (04.16%) patients with Mean and Standard deviation 246.25 and ± 093.29 respectively (Table No. 02).

➤ The patients were found at 1st Follow-up of GRBS level from the range 100-150 (mg/dl) 33 (32.67%), 150-200 (mg/dl) 29 (28.71%), 200-250 (mg/dl) 18 (17.82%), 250-300 (mg/dl) 11 (10.89%), 300-350 (mg/dl) 08 (07.92%), 350-400 (mg/dl) 01 (00.99%), and 450-500 (mg/dl) 01 (00.99%) patient with Mean and Standard deviation 170.29 and ± 71.12 respectively (Table No. 02).

➤ The patients were found at 2nd Follow-up of GRBS level from the range 100-150 (mg/dl) 15 (42.85%), 150-200 (mg/dl) 15 (42.85%), and 200-250 (mg/dl) 05 (14.28%) patients with Mean and Standard deviation 135.714 and ± 035.504 respectively (Table No. 02).

➤ The patients were found at 3rd Follow-up of GRBS level from the range 150-200 (mg/dl) 01 (50.00%), and 200-250 (mg/dl) 01 (50.00%) patient with Mean and Standard deviation 175.000 and ± 035.355 respectively (Table No. 02).

Quality of Life (QOL): (20%-Moderately Dissatisfied, 40%-Slightly Dissatisfied, 60%-Slightly Satisfied, 80%-Moderately Satisfied) (Table No. 03)

Quality of Life (QOL) measurement at different follow-up:

➤ At Baseline 10 (08.33%) patients were found Moderately Dissatisfied, 54 (45.00%) patients were found Slightly Dissatisfied, and 56 (46.66%) patients were found slightly Satisfied, with Mean and Standard deviation 47.66 and ± 12.75 respectively.

➤ At 1st Follow-up 05 (14.28%) patients were found Slightly Satisfied, and 30 (85.72%) patients were found Moderately Satisfied, with Mean and Standard deviation 77.143 and ± 07.10 respectively.

➤ At 2nd Follow-up 30 (85.72%) patients were found Moderately Satisfied, and 05 (14.28%) patients were found Slightly Satisfied, with Mean and Standard deviation 77.14 and ± 07.10 respectively.

➤ At 3rd Follow-up 02 (100.00%) patients were found Moderately Satisfied, with Mean and Standard deviation 80.00 and ± 00.00 respectively.

Knowledge Attitude and Practice (KAP): (Low KAP > 02 Scores, Medium KAP 01-02 Scores & High KAP 00 Score) (Table No. 03)

Knowledge Attitude and Practice (KAP) measurement at different follow-up:

➤ At Baseline 120 (100%) patients having Low KAP, with the Mean and Standard deviation > 02.00 and ± 00.00 respectively.

- At 1st Follow-up 99 (98.01%) patients were found with Medium KAP, and 02 (01.98%) patients found with High KAP, with the Mean and Standard deviation 00.98 and ± 00.14 respectively.
- At 2nd Follow-up 18 (51.42%) patients were possessing Medium KAP, and 17 (48.58%) patients were possessing High KAP, with Mean and Standard deviation 00.51 and ± 00.50 respectively.
- At 3rd Follow-up 02 (100.00%) patients were having Medium KAP, with Mean and Standard deviation 01.00 and ± 00.00 respectively.

Medication Adherence: (>02 Scores Low Adherence, 01-02 Scores Medium Adherence & 00 Score High Adherence) (Table No. 03)

Medication Adherence measurement at different follow-up:

- At Baseline 119 (99.16%) patients were having Low Adherence, and 01 (0.84%) patient was having Adherence to the medication, with Mean and Standard deviation 01.99 and ± 00.09 respectively.
- At 1st Follow-up 77 (76.23%) patients were having Medium Adherence, and 24 (23.76%) patients were having High Adherence to the medication, with Mean and Standard deviation 00.76 and ± 00.42 respectively.
- At 2nd Follow-up 14 (40%) patients possessing Medium Adherence, and 21 (60%) patients possessing High Adherence to the medication, with Mean and Standard deviation 00.40 and ± 00.49 respectively.
- At 3rd Follow-up 02 (100.00%) patients possessing Medium Adherence, with Mean and Standard deviation 01.00 and ± 00.00 respectively.

Table No. 01: Demographic details of enrolled patients (n=120)

Characteristics	No. (%)	P Value
Gender		
Male	96 (80.00)	0.005890
Female	24 (20.00)	
Age group (in year)		
20-30	04 (03.33)	0.000010
30-40	12 (10.00)	
40-50	16 (13.33)	
50-60	17 (14.17)	
60-70	42 (35.00)	
70-80	19 (15.83)	
80-90	10 (08.33)	
BMI		
(Under Weight) ≤ 18	00 (00.00)	0.000010
(Normal Weight) 18.50 - 24.90	04 (03.33)	
(Over Weight) 25.00 - 29.90	57 (47.50)	
(Obese Class- I) 30.00 - 34.90	50 (41.67)	
(Obese Class- II) 35.00 - 39.90	09 (07.50)	
Social history		
Alcoholic	14 (11.67)	0.000054
Smoker	03 (02.50)	
Both Alcoholic & Smoker	48 (40.00)	
Ex-Smoker	01 (00.83)	
Ex-Alcoholic	03 (02.50)	
Ex-Alcoholic & Smoker	18 (15.00)	
Non Alcoholic & Smoker	33 (27.50)	
Family History		
Married	117 (97.50)	0.000010
Unmarried	03 (02.50)	
Past Medical History		
HTN	75 (62.50)	0.000010
IHD	17 (14.17)	
CKD	19 (13.83)	
COPD	14 (11.67)	
Liver Disease	03 (02.50)	
TB	05 (04.17)	
Asthma	01 (00.83)	
Bronchitis	03 (02.50)	
Hypothyroidism	03 (02.50)	

Table No. 02: Laboratory Findings (n=120)

Characteristics	No. (%)	P Value
HbA1C %		
04-06	08 (06.67)	0.000010
06-08	41 (34.17)	
08-10	37 (30.83)	
10-12	27 (22.50)	
12-14	07 (05.83)	
GRBS (mg/dl)		
At Baseline		
100-150	05 (04.16)	0.000010
150-200	24 (20.00)	
200-250	26 (21.66)	
250-300	26 (21.66)	
300-350	23 (19.16)	
350-400	04 (03.33)	
400-450	04 (03.33)	
450-500	03 (02.50)	
500-550	05 (04.16)	
At 1st Follow-up		
100-150	33 (32.67)	0.000010
150-200	29 (28.71)	
200-250	18 (17.82)	
250-300	11 (10.89)	
300-350	08 (07.92)	
350-400	01 (00.99)	
450-500	01 (00.99)	
At 2nd Follow-up		
100-150	15 (42.85)	0.000010
150-200	15 (42.85)	
200-250	05 (14.28)	
At 3rd Follow-up		
150-200	01 (50.00)	0.000010
200-250	01 (50.00)	

Table No. 03: Quality of life (QOL), Knowledge Attitude and Practice (KAP) & Medication Adherence

Characteristics	No. (%)	P Value
Quality of life (QOL)		
At Baseline		
20% (Moderately Dissatisfied)	10 (08.33)	0.000010
40% (Slightly Dissatisfied)	54 (45.00)	
60% (Slightly Satisfied)	56 (46.66)	
At 1st Follow-up		
40% (Slightly Dissatisfied)	07 (06.93)	0.000010
60% (Slightly Satisfied)	42 (41.58)	
80% (Moderately Satisfied)	52 (51.48)	
At 2nd Follow-up		
60% (Slightly Satisfied)	05 (14.28)	0.000010
80% (Moderately Satisfied)	30 (85.72)	
At 3rd Follow-up		
80% (Moderately Satisfied)	02 (100.00)	0.000010
Knowledge Attitude and Practice (KAP)		
At Baseline		
>02 (Low KAP)	120 (100.00)	0.000010
At 1st Follow-up		
01-02 (Medium KAP)	99 (98.01)	0.000010
00 (High KAP)	02 (01.99)	
At 2nd Follow-up		
01-02 (Medium KAP)	18 (51.42)	0.000010
00 (High KAP)	17 (48.58)	
At 3rd Follow-up		
01-02 (Medium KAP)	02 (100.00)	0.000010
Medication Adherence		
At Baseline		
>02 (Low Adherence)	119 (99.16)	0.000010
01-02 (Medium Adherence)	01 (00.84)	
At 1st Follow-up		
01-02 (Medium Adherence)	77 (76.23)	0.000010
00 (High Adherence)	24 (23.76)	
At 2nd Follow-up		
01-02 (Medium Adherence)	14 (40.00)	0.000010
00 (High Adherence)	21 (60.00)	
At 3rd Follow-up		
01-02 (Medium Adherence)	02 (100.00)	0.000010

DISCUSSION

Clinical Pharmacist is part of a multidisciplinary team. This team normally consists of clinical pharmacists, physicians, nurses, technicians, nutritionists and other health care professions. All of the members in multidisciplinary team have important roles in diabetes management in achieving the goal of treatment, improving quality of life, controlling disease and its complications, delaying complication, and decreasing mortality and morbidity. Clinical pharmacist's interventions are an important factor to improve glycemic control in diabetic patients. Clinical pharmacist's interventions include diabetes education and counselling on drug, disease, diet, exercise, lifestyle modification, and self-management, assessment and adjustment of anti-diabetic medications, identifying and solving drug-related problems, co-operation with physician and other diabetes health care team.

The present study demonstrates that people with DM more in male within age group 60-70 years. This study shows that people with overweight, alcoholic, smoker, and HTN are more prone to type2 DM.

Report from the World Health Organization indicates that developed countries, more than half of the individuals do not correctly use the drugs and that this number is even higher in developing countries. In our study GRBS level significantly decrease in the first, second and third follow-up as compare to baseline and QOL, KAP, and Medication Adherence increases at first, second and third follow-up as compare to baseline respectively with Pharmaceutical care provided to patients at different follow-up. This would help patients meeting the target of their treatment and care for better management of DM.

We have utilized the PAID questionnaire, to assess the Pharmaceutical care in enrolled type2 DM patients which have shown to be an effective method to assess Pharmaceutical care in diabetes. This study focus on integration of clinical pharmacy services into overall healthcare delivery to type2 DM patients.

CONCLUSION

Pharmaceutical care is a patient centered process, which utilizes pharmacist's expertise in a multidisciplinary and collaborative patient care process to improve patient's clinical, economic, and humanistic outcomes. It is a measure of quality with measurable indicators where the patients, clinicians and caregivers all have roles to play towards improved patient

outcomes. The need for Pharmaceutical care is invaluable, especially in chronic disease management. By providing Supervised Pharmaceutical care for 6 months resulted in a significant improvement of glycemic in type2 DM patients. This study provides information that providing pharmaceutical care by pharmacist to type2 DM patients improve the QOL, KAP and adherence to medication. It also has an impact on controlling blood sugar level and solving or reducing the Drug Therapy Problems in type2 DM patients. Although further studies on larger subjects are necessary to provide adequate and more precise data. We believe that our findings qualify us to recommended Pharmaceutical care for type2 DM patients.

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