Original Article

INFLUENCE OF PHARMACEUTICAL CARE ACTIVITIES ON KNOWLEDGE ATTITUDE AND PRACTICE (KAP) AMONG DIABETIC PATIENTS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To assess the influence of pharmaceutical care activities on Knowledge, Attitude and Practice (KAP) among type 2 diabetic patients.

Methods: A total of about 301 patients with type 2 Diabetes Mellitus were recruited from a tertiary care hospital. Patients were educated about their disease condition, lifestyle modifications and diet regimen to be followed and were given instructions for improving medication adherence. In the initial session, no pharmaceutical care was given, in the second session patient counseling was given verbally and in the last session patient counseling was given both verbally and non-verbally by means of pamphlet distribution. KAP questionnaire and glycemic levels (glycated hemoglobin, fasting blood sugar and post-prandial blood sugar) of participants were obtained at baseline and at follow up.

Results: The baseline values of FBS in patients before intervention was found to be 176.5±74.46 mg/dL and it was reduced to 140.7±43.9 mg/dL after 3 mo. henceforth, there was also an improvement in the PPBS values which was found to be 254±77.3 mg/dL at the baseline and was 212.9±54.2 mg/dL after intervention. The baseline values of HbA1c is 8.144±1.727% and after intervention, value reduced to about 7.173±2.768%. After the intervention, it was found to be that 30%, 16% and 12% reduction in FBS, PPBS and HbA1c values and the P-value (<0.0001) found to be statistically significant. KAP scores also found to be improved after the intervention and statistically significant. The results clearly indicate that through proper guidance and educating the patients by the pharmacist is beneficial in managing the glycemic levels and reduce further complications.

Conclusion: The study concluded that the pharmaceutical care by the pharmacist is highly essentially and useful for the patients to manage the glycemic index and prevent further diabetic complications.

Keywords: Diabetes mellitus, Pharmaceutical care, Knowledge, Attitude and practice

INTRODUCTION

In India, diabetes has been known for a century as 'rich man disease' still, the incidence rate is increasing day by day. India has formerly represented 49 percent of the world's diabetes burden, with an estimated 72 million cases in 2017 and it is expected to almost double to 134 million by 2025. This presents a serious public health challenge to a country facing a future of high population growth and a government attempting to provide free health insurance to half a billion people. Diabetes Mellitus is a chronic disease which is having deleterious effects on the patient's health-related quality of life. According to the report prepared by WHO on World Health Day on 2016,422 million people (every one in 11) worldwide have diabetes and the number is likely to be double in the next 20 y. It is reported that its incidence is increasing rapidly and by 2030 this number is estimated to be around 552 million. India is considered to be the home for 109 million individuals with diabetes by 2035 based on the study conducted by the Indian Heart Association [1]. The American Diabetes Association reported that there will be tremendous growth in people diagnosed with diabetes by 2030 in India [2].

Diabetes Mellitus is a metabolic disorder characterized by chronic hyperglycemia accompanied by impairment in the metabolism of carbohydrates, lipids and proteins. Most patients with an imbalance in carbohydrate metabolism might have either type 1 DM (which is immune-mediated or idiopathic) or type 2 DM (formerly known as non-insulin dependent DM). Type 2 DM is the most common form of DM characterized by hyperglycemia, insulin resistance and relative insulin deficiency [3].

Diabetes is not only caused by insulin deficiency; it is also due to imbalance in growth hormones, glucocorticoids and glucagons. Like other diseases, mental stress also plays a major role in diabetes. So it is dynamic to know about the whole history of patients before

starting the drug regimen. The problem with diabetes is, it is poorly controlled, which leads to micro and macro vascular complications leading to increased mortality and morbidity and flaccid quality of life. India anchorages the largest number of the diabetic population in the world. The reason behind this is lack of knowledge, poor practices and medication non-adherence that highly influences the development of the disease and its complications which are highly preventable.

Pharmaceutical care is a professional practice recommended by WHO, which helps to avoid undesirable outcomes caused by drug therapy problems. It is a patient-centered area where the pharmacist can play an optimized role in promoting the health-related quality of life, prevention of disease, evaluate, monitor, initiate and alter the medications which is highly safe and effective in patients. It also helps in achieving affirmative and economical clinical outcomes. Pharmaceutical care mainly emphases the attitudes, behaviors, commitments, concerns, ethics, functions, knowledge, responsibilities and skills of the pharmacist's on the provisions of drug therapy with the goal of achieving definite therapeutic outcomes towards patient's health and quality of life [4].

Humanistic outcomes involves the patient's physical functioning like "activities of daily living", psychological health such as frequency, intensity and duration of anxiety, depression, life satisfaction and mental well-being and social health functioning collectively known as health-related quality of life. Especially in chronic diseases such as diabetes mellitus, kidney disease, cardiac diseases measurement of economic, clinical and humanistic outcomes is vivacious for treatment success.

In India, while communicable diseases are gradually controlled and eradicated, Non–communicable diseases, especially diabetes, significantly increases the burden of society. The immense reason is

due to changes in lifestyle due to highly paid salaries, availability of fast and unhealthy foods in recent years and poor people have difficulty in managing the disease because of lack of knowledge about the disease and its adverse effects on health. Diabetes is not only a disease of an ageing population, it also affects the people of all age groups. Apart from healthcare professional support, patient self-care regarding their disease helps in obtaining a good healthy life.

Hence this study was designed in such a way to discover the influence of education by healthcare professionals in terms of both humanistic and clinical outcomes among type 2 diabetic patients in a tertiary care hospital.

MATERIALS AND METHODS

A Prospective Interventional study with the aim of assessing the influence of pharmaceutical care activities on knowledge, attitude and practice among type 2 diabetic patients was conducted in a tertiary care hospital for a period of 6 mo from January to June 2017. Ethical approval was obtained from the hospital and the study was framed in accordance with their affirmation. Patients who visited during the study period were screened for study criteria. The Inclusion criteria were type 2 diabetic patients above 18 y of both the gender, outpatients, diabetic patients who admitted in other wards, exclusion criteria were patients aged below 18 y, juvenile and gestational diabetes, pregnant and lactating women, patients with severe physical and mental illness. Among those, 301 patients who met the inclusion criteria were enrolled and were explained regarding the purpose of the study and written informed consent was obtained from the patient. Patient information was kept confidential and the study did not interrupt the patient drug therapy. Patient details, including demographic, socioeconomic, education, duration of the disease, family history, medical history, co-morbidities, anthropometric assessment, screening habits for diabetic complications, presence of diabetic complications, glycemic control, physical activities, dietary habits, drug therapy, diabetic education, and level of follow up was registered in the specially designed pro forma at the baseline visit. Knowledge, attitude and practice questionnaire were constructed in their local language and the questionnaire was pre-tested for their understandability, convenience and time required to complete the questionnaire. After pre-testing a well-trained pharmacist administered the questionnaire. The questionnaire consists of 14 questions regarding knowledge, 5 questions on attitude and 6 questions regarding practice. Scoring of KAP questionnaire ranges from 0 to 2. From the questionnaire, the knowledge regarding the disease was assessed, which helps to educate the patients. At the first visit the patients were taught verbally regarding the basic information about diabetes, which consists of the disease condition, diet, lifestyle modification, measures to follow in case of hypoglycemia. At the second visit, again patient was educated verbally and non-verbally (pamphlets regarding the lifestyle changes and diet to be followed). At the final visit, same KAP questionnaire was circulated among the patients and was scored to assess the improvement in the KAP scores after interventions and glycemic levels were also measured. The data were analyzed using SPSS software. The results were expressed as mean±SD. Paired student t-test was performed to compare the values of fasting blood sugar, postprandial blood sugar and glycated hemoglobin and KAP questionnaire before and after an intervention (intragroup analysis) was also analyzed. P values<0.05 were considered as statistically significant.

RESULTS AND DISCUSSION

The age range of the participants in this study was between 21 to 80 y. and 174 were male and 127 were female patients. The number was found to be greater in the age group of 61-70 y, followed by 51-60 y (table 1). This increase in the incidence of diabetes in these age groups may be due to the deterioration in metabolic activity as a result of aging. Another factor known from the study is that there is poor glycemic control is more common in women than men. This is because of poor knowledge; even if they are educated too, they spend most of their time in family health and less attention towards their health. Educational status shows, 122 (41%) patients had not received a basic education, 69 (23%) patients had undergone primary school of education, 60 (20%) patients had the secondary school of education and 50 (16%) patients were graduates and postgraduates (table 1). The majority of the patients (41%) in the study were not found to have basic education or were unaware about the monitoring of glycemic levels and the importance of taking the medications regularly. The lack of education among the patients leads to poor understanding of their disease condition and its complications. Controlling the glycemic levels in these patients was challenging. Thus, literacy status had an impact in controlling the glycemic levels and in preventing their complications. Our results coincide with the study conducted by M. shooka *et al.* [5].

Table 1 Patient demographic details

Variable	Frequency	Percentage (%)
Age (years)		
21-30	10	3%
31-40	43	14%
41-50	47	16%
51-60	63	21%
61-70	87	29%
71 and above	51	17%
Gender		
Male	174	58%
Female	127	42%
Educational status		
Illiterates	122	41%
Primary	69	23%
Secondary	60	20%
Graduates and postgraduates	50	16%
Socio-economic status		
Lower	101	33%
Lower middle	125	42%
Upper middle	52	17%
Upper	23	8%
Duration of DM (years)		
<5	91	30%
5-10	111	37%
>10	99	33%
Family History		
Present	177	59%
Not present	124	41%

Economic status of the patient was assessed and found to be diverse in nature. Among 301 patients, 101 (33%) were found to be in the lower economic class, 125 (42%) were found to be in the lower middle class, 52 (17%) were found to be in the upper-middle class and 23 (8%) were found to be in the upper economic class **(**table 1**)**. Most of the patients belong to the middle class and lower, so they face difficulties in owning to the medication cost and opinions regarding the diet varies among their family members again leads to changes in the diet chart.

Patients were categorized based on disease durations, less than 5 y was found to be 91 (30%) while with a duration of 5-10 y of diabetes were 111 (37%). 99 (33%) patients had diabetes for more than 10 y (table 1). So, the majority of patients were found to have diabetes for durations>5 y. In this study, patients with duration of diabetes ≤5 y were found to have better glycemic control than those with the duration of diabetes ≥5 y. The greater the duration of the disease the attitude of the patients towards diabetic self-care management was found to be more compromised.

Among 301 patients, 177 (59%) patients had a family history of diabetes mellitus, while 124 (41%) patients did not have a family history of diabetes (table 1). The results of Masaru Sakurai *et al.* [6] showed that participants with a family history of diabetes had an 80% greater risk of incident diabetes compared with those without a family history of diabetes. Patients with a family history of diabetes had a general idea about the disease such as hereditary, sign, symptoms, treatment, what to do if glycemic levels go down.

Social habits like smoking and alcoholism are found in diabetic patients, which are also the cause for co-morbid conditions, diabetic complications and polypharmacy. A study conducted in diabetic patients showed that the progression of diabetic complications such as diabetic nephropathy was found to be increased in smokers than non-smokers [7]. Smokers 19% and 22% alcoholics were found among 301 subjects (table 2).

A majority of the participants in this study had co-morbidities, which causes a negative impact on the patient's quality of life. 194 (65%) patients were found to have hypertension, 22 (7%) patients with dyslipidemia, 21 (7%) patients had hypothyroidism, 13 (4%) patients were found to have lung diseases such as COPD, asthma and bronchitis while 4 (1%) patients had liver diseases such as cirrhosis and hepatitis (fig. 1).

Table 2 Social habits of the patients (n=301)

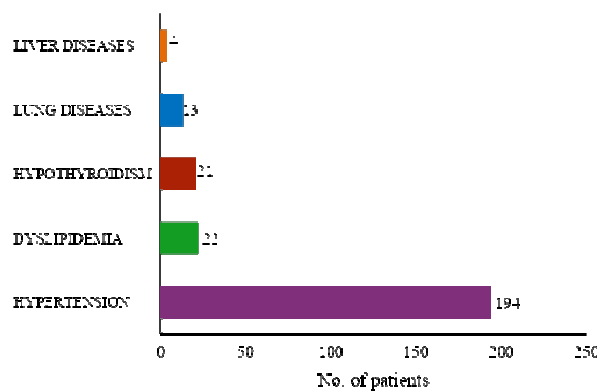| Social habits	Number of patients	Percentage (%)	CI (%)
Smokers	57	19%	14.9-23.7
Alcoholics	65	22%	17.3-26.5
Alcoholics+Smokers	21	7%	4.6-10.4
Non-alcoholics+non-smokers	179	59%	53.8-64.8

Fig. 1: Co-morbidities of the patient (n=301)

In the present study, 148 patients were found to have diabetic complications. Of whom 74 (25%) patients had IHD, 46 (15%) patients had diabetic neuropathy and gangrene, 24 (8%) patients had diabetic gastropathy, 28 (9%) patients had diabetic nephropathy, and 8 (3%) patients had diabetic retinopathy (fig. 2)**.**
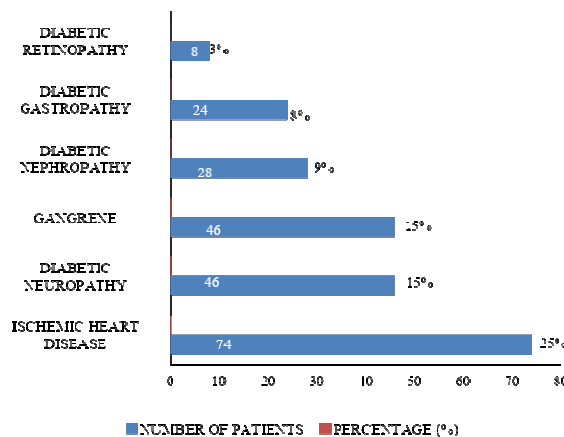

Fig. 2: Diabetic complications (n=301)

BMI was classified and found that 3 (1%) were underweight, 42 (14%) were normal, 59 (20%) were overweight and 197 (65%) were obese before the intervention. After the intervention, there was a mild increase in the category of overweight from 20% to 21%, while in the category of obese, there was a decrease from 65% to 64% (table 3). Obesity is a major risk factor for type 2

Diabetes Mellitus. Evidence suggests that for each kilogram increase in body weight, the risk of diabetes increases by 4.5% [8]. This result shows the physical inactivity in our subjects, which focuses on the lack of knowledge, attitude and practice about lifestyle modifications, diet and physical activity needed for the management of diabetes.

Table 3: Comparison of body mass index before and after an intervention (n=301)

Category	BMI range (kg/m²)	Before intervention			After intervention		
		No. of patients	%	CI (%)	No. of patients	%	CI (%)
Underweight	<18	3	1%	0.3-2.8	3	1%	0.3-2.8
Normal	≥18to<22.9	42	14%	10.4-18.3	42	14%	10.4-18.3
Overweight	≥23to<24.9	59	20%	15.5-24.4	63	21%	16.7-25.8
Obese	>25	197	65%	59.9-70.6	193	64%	58.5-69.3

The baseline values of FBS in patients before intervention were found to be 176.5±74.46 mg/dl and it was reduced to 140.7±43.9 mg/dl after 3 mo (20% reduction) in FBS after pharmacist intervention and the P-value (<0.0001) was found to be statistically significant. Henceforth, there was also an improvement in the PPBS values, which was found to be 254±77.3 mg/dl at the baseline and was 212.9±54.2 mg/dl after intervention (16% reduction). This shows that counseling was

effective in lowering glycemic levels. In the present study, the baseline values of HbA1c is 8.144±1.727%, and after the intervention, value reduced to about 7.173±2.768% (12% reduction) and the P-value (<0.0001) of HbA1c was found to be statistically significant (table 4). A study conducted by Kalyani N. Patni *et al.* [9] showed that integrated pharmaceutical care by clinical pharmacists yields in the reduction of glycemic control among diabetes.

Table 4: Comparison of mean base value and review value of FBS, PPBS and HbA1c (n=301)

Clinical parameters		Mean	SD	CI (%)	Mean difference	SD difference	P value
FBS	Base	176.5	74.46	168.05-184.94	35.81	48.56	<0.0001
(mg/dl)	Review	140.7	43.9	135.72-145.67			
PPBS (mg/dl)	Base	254	77.3	245.23-262.76	41.09	48.42	<0.0001
	Review	212.9	54.2	206.75-219.04			
HbA1c (%)	Base	8.144	1.727	7.94-8.33	0.971	2.775	<0.0001
	Review	7.173	2.768	6.85-7.48			

KAP questionnaire was circulated among patients before and after an intervention. KAP scores at the baseline and follow-up were calculated and found that baseline values of knowledge were about 15.87±6.019, attitude 6.677±2.157 and practice 7.797±2.084 indicating less knowledge, attitude and practice table 5. After counseling, there was a 32% increase in knowledge, a 35% increase in attitude and 23% increase in practice, which showed that pharmaceutical care provided by the trained pharmacist was very useful. A study conducted among diabetic patients in Nepal showed that diabetes-related knowledge, attitude and practice can be

improved with the help of a pharmacist [10]. A similar study conducted by Renuga *et al.* [11] showed that after intervention KAP scores were found to be statistically significant. From these results, we conclude that through intensive patient education, knowledge, attitude and practice about diabetes have a positive impact on the glycemic control. This result also focuses on the need of intensive patient education programs through training pharmacists which includes the management of diabetic complications, lifestyle modifications, diet, physical activity should be mainly given to patients who are at pre-diabetic, diabetic and at risk.

Table 5: Comparison of KAP scores before and after an intervention (n=301)

Variables	Before intervention		After intervention		P-value
	(mean±SD)	CI (%)	(mean±SD)	CI (%)	
Knowledge	15.87±6.019	15.18-16.55	21.01±3.697	20.59-21.42	<0.0001
Attitude	6.677±2.157	6.43-6.92	9.023±1.297	8.87-9.17	<0.0001
Practice	7.597±2.084	7.36-7.83	9.363±1.471	9.19-9.52	<0.0001

During the initial visit, it was found that many patients were taking a high amount of rice and fewer amounts of vegetables at higher intervals in their diet plan. They were educated about the importance of following a planned diet for better glycemic control. It includes a large amount of vegetables in their diet in the form of salads. Raw salads consist of vegetables like tomato, cucumber, onion, cabbage, capsicum etc., which are rich in fibers. These vegetables, when added to lunch and dinner, play a major role in reducing glycemic levels. Patients were counseled regarding the importance of a fixed quantity of meals at a fixed time instead of taking a large meal or frequent meals. Patients were advised to reduce the number of tea breaks to avoid more consumption of refined sugar. After an intervention, it was found that the amount of rice intake and sugar consumption in coffee or tea was reduced; namely, rice was reduced from 1 cup to 3/4th cup and 4 cups of coffee/tea to 2 cups. Amount of pulses like Bengal gram, peanuts, sprouted grains, etc., which are rich in proteins (lean

proteins) was included in the patient's diet plan. The study found that in the initial visit, patients had a misconception that some fruits can increase their glycemic level and this has been changed after the counseling. The benefits of fruits like apple, grapes, papaya, guava, etc., were explained to have a low glycemic index, which in turn increases insulin sensitivity. At the same time, the quantity of fruits with a high glycemic index such as mango and banana intake was advised to be reduced. They were also educated to use sunflower oil or gingerly oil in their diet as it reduces the risk of dyslipidemia. Our result was supported by another study which showed that patients who are receiving periodic intensive diet counseling did not show any symptoms of progression to diabetic complications [12].

Exercise improves blood glucose control in type 2 diabetes, reduces cardiovascular risk factors, contributes to weight loss and improves patient well-being [13, 14]. We found that many patients were

unaware about the importance of exercise in diabetes and their role in the management of the disease. Patients were educated about the importance of aerobic and strengthening exercises in type 2 DM for a better quality of life. Aerobic exercises like brisk walking (100 steps per minute), jogging (running at a steady pace), cycling and low impact aerobic exercise classes and the strengthening exercises like sit-ups and pushups were advised to the patient and also advised to wear footwear during exercise to avoid foot injuries. They were asked to do the exercises for a duration of 30 min, which can be split and done for at least 5 d per week. Incidental physical activities like climbing stairs instead of using elevators, vacuuming and walking to the bus stops. Patients were also educated about the management of exercise-induced hypoglycemia to be followed by consumption of fast-acting carbohydrates (regular soda, sweet candy and glucose water). Patients were advised to stop the exercise and seek medical emergency in case of numbness, tingling and confusion. Diabetes cannot be managed only through pharmacological regimen; it also requires proper guidance and patient education [15].

LIMITATIONS OF THE STUDY

[1] The study was carried out for six months' period if it is extended for longer periods the impact of counseling can be still be measured effectively [2] Only type 2 diabetic patients are involved in this study [3] the study focused only diabetic patients not the whole population [4] it involves the only inpatient.

CONCLUSION

Our study showed a significant association between perceived health status and other demographic, socioeconomic and clinical characteristics of patients suffering from DM. These findings reflect the importance of considering comprehensive care to the patient in the form of patient counseling to improve their health status. Our study reflects the need and the responsibilities of the pharmacist in providing pharmaceutical care to patients suffering with type 2 diabetes. Pharmaceutical care is a process which is to be continued during the lifetime of the patient and not to be stopped. The study also enlightened the pharmacist role not only confined in dispensing of medication, one step move forward and has created opportunities in counseling the patient and helping the diabetic patient to have a better quality of life has a greater role in the prevention of diabetic complications and the management of the glycemic controls on a daily basis through patient education.

AUTHORS CONTRIBUTIONS

Anju Abraham, MVN Bindhu Bhargavi, R Devika equally contributed the work in literature collection, methodology development, designing of pamphlets, the collection of data, statistical analysis. Shailaja K, Assistant Professor, supervised and assisted the whole study.

CONFLICTS OF INTERESTS

Declared none

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