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Research Article

SCREENING THE INFLUENCE OF COMORBIDITIES TREATMENT ON DIABETES MANAGEMENT

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ABSTRACT

Purpose of the study : Diabetics is a chronic metabolic disorder associated with high blood glucose level, it causes various co-morbidities. Family physicians are responsible for diagnosing and treating the majority of people with diabetes mellitus and its associated co-morbidities. This study aims to screen the influence of co-morbidities treatment on diabetic management in tertiary care hospital.

Methodology : Demographic details of patient, present disease condition, drugs prescribed was collected from case report and their care takers were interviewed for their past medication history, family history and their priorities on diabetic care.

Results : Out of 152 cases 61.8% were males and 38.1 % were females. The majority of patients belong to 51-60 years age group. When we combined all co morbidities into single score, we found the expected relationship the greater the number of co-morbities the lower the scores for diabetes prioritization and diabetes management. Different co-morbid conditions are responsible for the progression of the disease. Hypertension, Coronary artery disease, Chronic kidney disease has more effect on diabetic management.

Conclusion : This study confirms the need for comprehensive guidelines to effectively care for patients with multiple diseases. Hence effective standard guidelines are needed for the management of diabetes and its co-morbidities.

Keywords : *Co-morbidities, coronary artery disease, diabetes mellitus and hypertension.*

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INTRODUCTION

Diabetes mellitus is a group of metabolic disorders of fat, carbohydrate, and protein metabolism that results from defects either in insulin secretion or insulin action (sensitivity), or both. Diabetes mellitus is a state of chronic hyperglycemia (i.e., the state of having excess concentration of glucose in the blood), which may result from many environmental and genetic factors often jointly action. The major effects of diabetes includes ketoacidosis (diabetic coma), the progressive development of the disease has an effect on kidney, retina, damage to peripheral nerves, and excessive arteriosclerosis. Effective diabetes management often presents enormous challenges. Not surprisingly clinicians and patients alike can be overwhelmed by the need to address co-morbid chronic conditions in addition to patient diabetes-specific treatment goals. Ignoring concurrent disease management however can lead to ineffective control of diabetes specific risk factors and may miss opportunities to improve patients functioning, quality of life, and mortality risk. According to the Medical Expenditure Panel Survey, most patients with diabetes have at least one comorbid chronic disease and as many as 40% have

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at least three comorbidities. Other more troubling trends have conspired to increase the impact of multimorbidity on diabetes management. In many health care systems, providers see patients during brief office visits and are overwhelmed by the number of health maintenance activities recommended by guidelines and quality monitoring agencies. When diabetic patients have multiple chronic conditions screening, counseling, and treatment needs can far exceed the time available for patient-provider visits. Health problems that used to be treated in inpatient settings are increasingly managed within outpatient care, further straining providers resources for addressing diabetes specific management goals with in an adequate health system support and little guidance about how to manage multimorbid patients, diabetes providers can become frustrated with their inability to meet patients multiple treatment demands. Comorbid conditions may shift priority away from diabetes and complicate patients self-management. We know, for example, that conditions such as heart failure (HF), depression, and chronic pain can have a more debilitating impact on patients functional and health status than diabetes per se. Similarly, people with both diabetes and chronic pain are more likely to experience difficulty following their recommended exercise plan, even when controlling for concurrent depression. Comorbid conditions may also serve as competing demands on patient self-management resources, potentially reducing the amount of time and energy left for diabetes self-care. Conversely to the extent that some self-care activities necessary for other conditions are consistent with diabetes self-care goals for (example, diet and exercise in mild-moderate heart failure) having a co-morbidity may not detract from diabetes self-care. The impact of co-morbid conditions on diabetes may depend largely on the severity of the co-morbidity. This study aims to screen the influence of co-morbidities treatment on diabetic management in tertiary care hospital.

METHODOLOGY

A prospective observational study was conducted in a tertiary care hospital for the period of eight months (December 2015 to July 2016). The data was collected from various sources like nursing chart, patients admission chart, patient history sheet and doctor's orders sheet were collected and analyzed.

Inclusion Criteria : All the diabetic mellitus patients along with other co-morbid conditions who are admitted as inpatients and outpatients were included in this study.

Exclusion Criteria : In this study patients admitted in day care for chemotherapy, palliative care patients, intensive care unit (ICU) patients, terminally ill patient and gestational diabetes patients were excluded in this study.

RESULTS

Out of 152 patients 94(61.8%) were male and 58(38.1%) were females. The majority of patients belong to 51-60 years (69.3%) age group shown in figure 1 and figure 2. 59.86% (91) patients were normal body mass index(BMI), followed by overweight patients that is 52 (34.2%) patients exhibited in table 1. The HbA1c percentage in the study population tells that, most of the cases are above 6.5% of HbA1c.Among the diabetic patients most of the patients were hypertension 98(64.4%) and followed by CAD59(39%) patients presented in table 2.

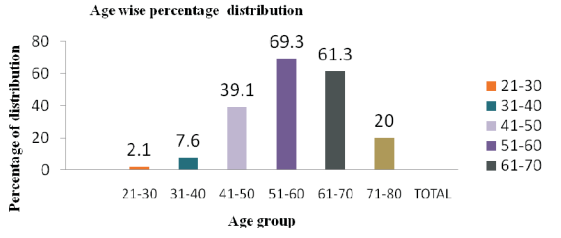

Fig. 1: Percentage of diabetes patient age wise distribution.

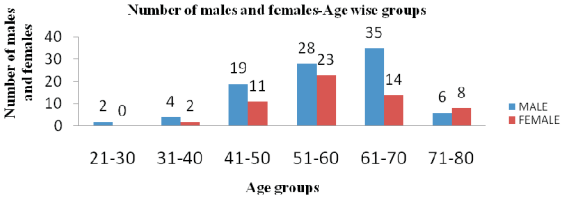

Fig. 2: Number of male& female patients age wise.

Table 1: Body mass index of patients with diabetic

S.No.	Category of BMI	No of patients	Percentage
1.	Normal (N)	91	59.86
2.	Obese (OB)	6	3.94
3.	Over Weight (OW)	52	34.2
4.	Under Weight (UW)	3	1.97
	Total	**152**	

Table 2: Number and percentage of co-morbid condition observed in the diabetes mellitus patients

S.No	Comorbid condition	Number of patients	Percentage
I.	**Concordant Microvascular Complications**		
1.	Renal Disease		
a.	Chronic kidney disease	32	21
b.	Renal calculi	11	7.2
2.	Diabetic eye disease	7	4.6
II.	**Concordant Macrovascular Complications**		
1.	Coronary artery disease	59	39
2.	Hypertension	98	64.4
3.	Heart failure	1	0.6
III.	**Both Concordant Microvascular and Macrovascular**		
1.	Cellulitis	13	8.5
2.	Gangrene	7	4.6
IV.	**Discordant Conditions**		
1.	Arthritis	7	4.6
2.	Thyroid	7	4.6
3.	Gastric enteritis	3	1.9

Among the 152 diabetic patients prescriptions most of the prescriptions i.e. 64(42.1%) prescription were prescribed with 6 -7 drugs projected in table 3. The above patients were asked the questions on diabetes prioritization about 53.2% disagree and 7.8% neither disagree nor agree and 33.5% agree. For question number 1. about 35.5% disagree and 2.6% neither disagree nor agree whereas 61.8% agree for question number 2. For question number 3 about 23.6% disagree and 34.8% neither disagree nor agree and 41.4% agree shown in table 4.

Table 3: Number of drugs per prescription

S.No	Number of drugs per prescription	Number of prescriptions	Percentage of prescriptions
1	0 To1	0	0
2	2 To3	4	2.6
3	4 To 5	30	19.7
4	6 To 7	64	42.1
5	8 To 9	35	23.0
6	10 To 11	14	9.2
7	12 To 13	5	4.0

Table 4: Diabetes mellitus Patients prioritization

S.No	Questionnaires	Disagree	Percentage	Neither disagree nor agree	Percentage	Agree	Percentage
1.	Taking care of my diabetes is my top priority right now.	89	53.2	12	7.8	51	33.5
2.	I have other health problems that are more important than diabetes.	54	35.5	4	2.6	94	61.8
3.	I have many more important things in my life than diabetes to take care of now.	36	23.6	53	34.8	63	41.4

The patients were also asked the 5 questions on diabetes management ability. When they were asked this question number 1about 32.8% difficult and 7.8% very difficult and 59.2% not difficult, question number 2 were answered as 26.9% difficult and 59.8% very difficult and 13.1% not difficult, question number 3 about 42.7% difficult and 26.3% very difficult and 30.9% not difficult, the question number 4 were answered as 28.9% difficult and 46.7% very difficult and 24.3% not difficult and for question number 5 about 32.8% difficult and 19.0% very difficult and 48.0% not difficult shown in table 5. Diabetes prioritization and diabetes management ability were also evaluated from the patients on the basis of macro vascular and micro vascular conditions were presented in table 6. Among the above patients 66 patients were treated with insulin during the hospital stay and 86 patients were treated with oral hypoglycemic drugs.

Table 5: Questionnaires to the patients on the diabetes management ability

S.No	Questionnaires	Difficult	Percentage	Very difficult	Percentage	Not difficult	Percentage
1.	Taking diabetes medications (pills and/or insulin)	50	32.8	12	7.8	90	59.2
2.	Exercising regularly	41	26.9	91	59.8	20	13.1
3.	Following your recommended eating plan	65	42.7	40	26.3	47	30.9
4.	Checking your blood sugar	44	28.9	71	46.7	37	24.3
5.	Checking your feet for wounds or sores	50	32.8	29	19.0	73	48.0

Table 6: Diabetes prioritization and diabetes management ability evaluation

S.No	Questionnaires on Comorbidity type	Diabetes prioritization (percentage)	Diabetes management ability(percentage)
1	1 concordant microvascular	86.4	18
2	1 concordant macrovascular	32.2	29
3	2-3 concordant macrovascular	24	24.6
4	1 discordant	82.2	37.7

The antihypertensive drugs prescribed in hypertensive patients were calcium channel blockers in 30 patients shown in table 8. In coronary artery disease (CAD) patients the drugs prescribed were antiplatelets, nitrates and anti-arrhythmic drugs shown in table 9. In chronic kidney disease (CKD) management drugs prescribed were shown in table 10. Sixty patients were found with high cholesterol levels are prescribed mostly with statins as shown in table 11. Out of 152 diabetic patients a total of 5 patients have gastro enteritis. So for the management

of gastro enteritis in diabetic patients, drugs for peptic ulcer are prescribed for 11 patients were with arthritis disease, the drugs prescribed for this disease in diabetic patients is shown in table 12. Thirteen patients had cellulitis. The drugs prescribed for this disease in diabetic patients is seen in table 13.

Table 7: Oral hypoglycemic drugs prescribed in diabetic mellitus patients

S.No	Drug	Number of Prescription	Percentage
1	Metformin	49	32.2
2	Gliclazide	5	3.2
3	Glipizide	13	8.5
4	Glimeperide	15	9.8
5	Glimeperide+Metformin	4	2.6

Table 8 : Drugs used for hypertension in patients having diabetes with hypertension

S.No	Category	Generic names	Number of prescription	Percentage
1	Calcium Channel Blockers	Amlodipine	30	30.6
2	Angiotensin Receptor blockers	Telmisartan +hydrochlo--rothiazide	12	12.2
3	Diuretics	Torasemide	11	11.2
4	Angiotensin converting enzyme inhibitor	Ramipril	26	26.5
5	Beta adrenergic blockers	Atenolol	18	18.3

Table 9: Drugs used for coronary arteries diseases (CAD) in patients having diabetes with CAD category wise

S.No	Category	Number of prescription	Percentage
1	Anti-platelets	46	77.9
2	Nitrates	10	16.9
3	Anti-arrhythmic	3	5
	Total	**59**	

Table 10 : Drugs used for chronic renal disease (CKD) in patients having diabetes with CKD

S.No	Category	Generic name	Number of prescription	Percentage
1	Diuretics	Torasemide	29	90.6
2	Iron formulation	Ferrous fumarate+ folic acid	10	31.2
3	Vitamin	Erythropoietic	12	37.5
4	Glycoprotein	Furosemide	3	9.3

DISCUSSION

In this study it was found that the majority of patients belong to age group between 51-60 year. The HbA1c percentage in the study population tells

Table 11 : Statins used in patients having diabetes with dyslipidemia

S.No	Category	Generic name	Number of prescription	Percentage
1.	Hypolipidemic drugs, HMG-Co reductase inhibitor	Atorvastatin	54	88.5
2.	Hypolipidemic drugs, HMG-Co reductase inhibitor	Rosuvastatin	6	9.8

Table 12 : Drugs used for arthritis in patients having diabetes with arthritis category wise

S.No	Drug	Category	Number of prescription	Percentage
1	Aceclofenac	NSAID's	10	90.9
2	Diclofenac	NSAID's	8	72.7
3	Tramadol	Analgesic	11	100

Table 13 : Drugs used for cellulitis in patients having diabetes with cellulitis

S.No	Category	Generic name	Number of prescription	Percentage
1	Antibiotic	Cefoperazone+ Sulbactum	13	100
2	Anti fungal drugs	Fluconazole	12	92.3
3	Analgesics	Tramadol	8	61.5

that, most of the cases are above 140mg/dl (6.5%) of HbA1c. By this it can be understood that the sugar levels needed to be controlled immediately and precautions should be taken by both by physicians as well as from the patient side. Our results suggest that some conditions may have little impact on diabetes prioritization and diabetes management ability. When we combined all co morbidities into single score, we found the expected relationship, the greater the number of co-morbities the lower the scores for diabetes prioritization and diabetes management. We found out that the presence of macrovascular conditions was associated with both lower diabetes prioritization and diabetes management ability.

Evidence supports aggressive blood pressure targets in patients with diabetes. Angiotensin converting enzyme inhibitors prevents or delay micro vascular and macrovascular complication of diabetes and recommended as first line anti-hypertensive agents in diabetic patients with kidney disease and also angiotensin receptor blocks can reduce the complications of diabetes. Thiazide diuretics, either as nanotherapy or as a part of a combination regimen, are beneficent in the treatment of hypertension in patients with diabetics to reduce

cardiovascular and cerebrovascular events in patients with type 2 diabetics. Beta blockers are useful adjunct when combination therapy is needed to achieve target blood pressure in patients with diabetes. Calcium channel blockers reduce cardiovascular events in patients with diabetes and hypertension. Most patients with diabetes require combination therapy to attain a blood pressure less than 130/80mmHg. For most patients beta blockers and calcium channel blockers has been used as third line agents.

From the studies it was shown that adequate blood pressure control markedly reduced major cardiovascular events in patients with diabetes. Platelets and coagulation abnormalities contribute CAD in diabetes. Current evidence supports anti-platelets therapy for diabetes. In present study a total of 59 people with CAD. Aspirin and clopidogrel was prescribed in large numbers 46(77.9%) whereas nitrates 10(16.9%) and antiarrythmic are given in 3(5%). Aspirin is safe and effective in patients with diabetes for management of acute coronary syndromes and to treat acute coronary disease in DM patients and reduces cardiovascular diseases. When Aspirin and glimeperide given the patient blood sugar level was getting too low. This combination is to be monitor carefully.

It was observed that the presence of microvascular conditions was associated with lower diabetes management ability but not lower prioritization scores. It is plausible that when persons develop diabetic microvasular complications they have more difficulty with self management tasks, i.e retinopathy may make checking blood sugar difficult and neuropathy may impede exercise. It is also possible that patients who had more difficulty with self management were more likely to develop microvascular complication.

Diabetes treatment play significant role in treating CKD. Anti-hypertensive drugs therapy is used in treating CKD. In the present studies a total of 32CKD patients. Diuretics were prescribed in 29(90.6%) patients, iron formulation 10(31.2%) patients and vitamins 12(37.5%) patients and glycoproteins in 3(9.3%) patients. These reduce the progression of kidney failure. For dyslipidemia in diabetic patients atorvastatin was used in 54(88.5%) patients and Rosuvastatinin 6(9.8%) patients to lower the cholesterol level in diabetes presented in Table-11. People diagnosed with diabetes are nearly twice as likely to have arthritis, drugs used are acelofenac in 4(57%) patients, diclofenac in 2(28.5%) patients and tramadol in 5(71.4%) patients to lower the pain in arthritis with diabetic patients.

Diabetic foot infection such as cellulitis is very common. Glycemic control must be achieved to affect the outcome of antibiotics is used for this treatment. Drugs used were Cefoperazone + Sulbactum in 13(100%) patients, Fluconazole in 12 (92%) patients and Tramadol 8(61.5%) patients.

Table 14 : The common drug – drug interactions noticed in prescriptions of diabetes mellitus patients with other co-morbidities

S.No	Combination	Type of interaction	Number of patients	Percentage	Influence
1.	Metformin and telmisartan/ hydrochloro-thiazide	Moderate	7	7.14	Hydrochlorothiazide can increase blood sugar levels
2.	Ramipril+ Glipizide	Moderate	2	2.0	Ramipril can increase the effect of glipizide and cause blood sugar levels to get too low
3.	Ramipril+ Metformin	Moderate	6	6.1	Cause blood sugar levels to get too low
4.	Aspirin+ Glimeperide	Moderate	5	8.4	Cause blood sugar levels to get too low
5.	Aspirin+ Amlodipine	Moderate	1	1.6	May cause blood pressure to increase.
6.	Torasemide+ metformin	Moderate	5	15.6	It can increase blood sugar levels and interfere with diabetic control
7.	Furosemide+ metformin	Moderate	1	3.1	It can increase blood sugar levels and interfere with diabetic control
8.	Fluconazole+ Glipizide	Moderate	1	7.6	It may increase the risk of hyperglycemia
9.	Metformin+ Levofloxacin	Moderate	1	14.2	Both hypoglycemic and less frequently hyperglycemic may occur

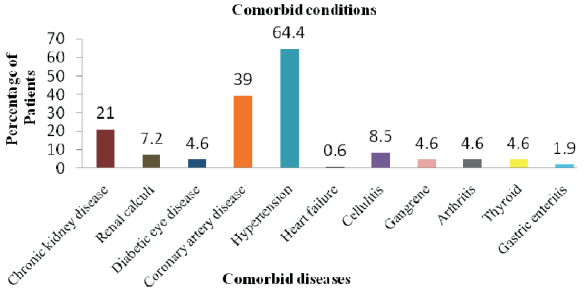

Fig. 3: Percentage of diabetic patients found with other co-morbidities.

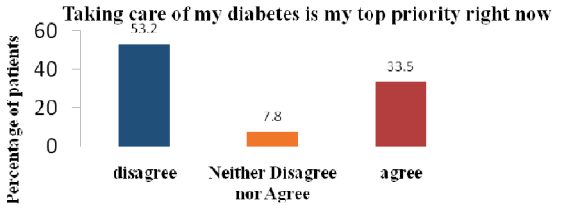

Fig. 4: Taking care of diabetes priority.

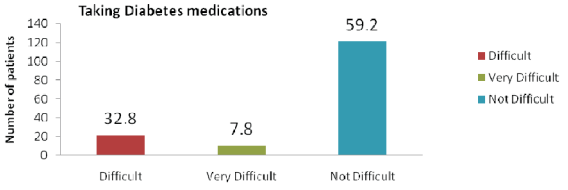

Fig. 5: Patient opinion about the taking of diabetic medications.

CONCLUSION

Different co-morbid conditions are responsible for the progression of the disease. From our study we now know that patients with type 2 diabetes are at much greater risk of mortality and morbidity from macrovascular disease than from microvascular complications. Our study has concluded that patients with greater number of co-morbidities are less likely to place priority on diabetes and have more difficulty with diabetes management tasks.

Although this study focused on patients with diabetes, it was likely that similar interactions among co-morbidities exist for patients with other common chronic conditions. New models of care organization, such as those that focus on a "medical home" for care coordination, may help to address the needs and preferences of patients with multiple conditions. It is clear that the aging population is facing significant challenges in managing the demands of multiple co-morbiditic conditions.

This study confirms the need for the comprehensive guidelines to effectively care for patients with multiple diseases. Hence effective standard guidelines are needed for the management of diabetes and its co-morbidities. Now the time has come to the Pharmacist to take up the challenge of better understanding how to adapt the diabetes management strategies to balance the benefits and risks of multiple medical recommendations and to incorporate patient preferences.

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