REVIEW OF PHARMACEUTICAL CARE PROGRAM FOR TYPE 2 DIABETES MELLITUS

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ABSTRACT

Diabetes mellitus is a chronic disease condition characterized by hyperglycemia, which if uncontrolled leads to various short terms and long-term complications. Type 2 Diabetes mellitus account for 90-95% of those with Diabetes mellitus The prevalence rate of Type 2 Diabetes mellitus is high in India and is expected to rise. This rise is due to low literacy rate, lack of public awareness, lack of advanced healthcare facilities and sedentary lifestyle. The contribution of pharmacists in diabetes management is so far not documented in India. Grounded on literature revise we concluded that evaluate the 'knowledge' 'attitude' and 'practice of diabetics' 'drug prescribing pattern, and the impact of pharmaceutical care program on glycemic control, direct cost Involvement and patient satisfaction Evidence suggests that pharmaceutical care produces improvements in glycemic control; however, little is known about its impact on humanities outcomes such as health-related quality of life (HRQoL). This review aimed to address this gap. Diabetes is a disease that needs more pharmacist involvement.Pharmacists could contribute to such programs through pharmaceutical care (PC). This Pharmaceutical care (PC) study will improve the quality of life (QOL), health-related quality of life (HRQOL). Pharmaceutical care is the straight, "accountable situation of medication-related care with the purpose of achieving definite outcomes that improve a patient's quality of life in Type 2 Diabetes mellitus". The overall PC improves patients' outcomes, reduce cost, and promote patients quality of life. patients' satisfaction, HRQoL

KEYWORDS: Type 2 Diabetes mellitus Pharmaceutical care, Health-related quality of life, health Outcomes.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic progressively metabolic disorder which is now reaching epidemic proportions in both developed and developing countries. In 2013, estimated 6.6% or 295 million adults were affected globally, and this is predicted to increase to 7.7% (439 million adults) by 2030. [1] Diabetes is a life-threatening condition that causes 3 million deaths per year worldwide. The countries most affected by this epidemic in the year 2025 will be India, China and the USA.[2] Diabetes mellitus is a group of metabolic disorders characterized by hyperglycemia and abnormalities in carbohydrate, fat and protein Metabolism.[3] A Type 2 Diabetes mellitus account for 90-95% of those with Diabetes mellitus Is also called as non-insulin Dependent diabetes mellitus, type II diabetes or adult-onset diabetes. Both genetic and environmental factors have been concerned with the aetiology of Type 2 Diabetes mellitus. The risk factor for the disease is older age, obesity, family history and lower socioeconomic status. Type 2 Diabetes mellitus is a heterogeneous disorder.[3,4] It is characterized by defects in Insulin secretion as well as insulin action. level i.e. Fasting plasma glucose management > 7.0 mmol/l (126mg/dl) or post Prandial Diabetes mellitus is characterized by a high Blood glucose concentration hyperglycemia, is usually characterized by elevated plasma Glucose plasma glucose > 11.1 mmol/l (200mg/dl). It happens due to deficiency or Defective response to insulin. The symptoms of type 2 diabetic include polyuria, Polydipsia, fatigue, blurred eyesight, sexual dysfunction, numbness, frequent infections Dry, itchy skin. Diabetes mellitus is one of many risk factors for macrovascular disease (cardiovascular disease, stroke, peripheral vascular disease). Glucose toxicity appears to impart most to the development and progression of microvascular complications, which include retinopathy, nephropathy and neuropathy. Disease Impact the socio-Economic and public health impact of Diabetes mellitus on both individuals and society is ever Increasing the complications of Diabetes mellitus are also likely to have significant effects on the Patient's health-related quality of life(HRQoL), the long-term complications have a prejudicious effect on quality of life (QoL) with diabetes is set to rise from about 126 million in 2012 to 300 million in 2025.[3,5] Currently, it has been estimated that 25 million Indians suffers from diabetes and the projects indicate the largest group of Diabetes Mellitus patient in India by the year 2025.[4,5] recent surveys predict an increase in the prevalence of diabetes in adults from 4% in 2012 to 6.4% by the year 2025.[1-5]

Furthermore, Diabetes mellitus is a common and very prevalent disease affecting the citizens of both developed and developing countries. It is estimated that 25% of the world population is affected by this disease. It is a metabolic disorder as a result of lack of insulin, defective insulin action, or both. Insulin deficiency, in turn, leads to chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism.[6,3,4] the United States. It is predictable that only 8% of patients with diabetes adhere entirely to all aspects of their regimen Adherence rates for insulin- injection regimens range from 20% to 80%, adherence to dietary recommendations is about 65%, and adherence to exercise regimens varies from 19% to 30%. Glucose-monitoring adherence rates range from 57% to 70%. India, "food prescriptions" were accompanied commonly by only 38% of patients .as in a revise in the US regarding half (52%) followed a meal plan.[7]

The morbidity and mortality related to Type 2 diabetes mellitus result from complications associated with the duration and brutality of disease and degree of disease control. These include coronary heart disease, stroke, blindness, and kidney failure.**[7,3]** really, evidence suggests that control of glycemia and other cardiovascular risk factors among many people with Type 2 diabetes mellitus In recent years, pharmacists, highly trained healthcare professionals with knowledge in medicines, have required developing an elaborated role in diabetes care to meet the needs of this patient population. Pharmacists in both community and clinic settings can also have ongoing relationships with other health care providers and can serve as the "bridge" between health care providers and the patients, thus ensuring continuity of care. In addition, as medications play a key role in preventing the complications of Type 2 diabetes mellitus, ensuring their effectiveness through monitoring and supporting adherence and covering for drug-related problems is decisive to achieving improved health outcomes. Stays on suboptimal.[8–5] Hepler and Strand as pharmaceutical care.[8,5] Defined as the "responsible provision of drug therapy" for the principle of achieving definite outcomes that get better a patient's QoL, pharmaceutical care requires the collaborative of the pharmacist with the patient and other professionals in "designing, implementing, and monitoring a therapeutic plan" with the pharmacist directly responsible to the patient.[9,8,5] The most important humanistic outcome, which is a central focus of pharmaceutical care, is health-related QoL (HRQoL). In general, people with T2DM have more piteous QoL than those without a chronic disease. Day to day, to keep blood glucose levels within a normal range, they must take medication, carefully control their diet and physical activity, and undertake regular self-monitoring of blood glucose. Long term, this can exact a heavy psychosocially

toll, which in turn may affect self-management behavior and, ultimately, long-term glycemic control, the risk of developing long-term complications, and QoL.[10] The intend of this review was to recognize and review the impact of pharmaceutical care on "HRQoL" in patients with T2DM. For the purposes of this review, assess the benefits of pharmaceutical care in promote patient care and disease management. The overall PC improves patients' outcomes, reduce cost, and promote patients quality of life. Patients' satisfaction, HRQoL

Pathophysiology

Diabetes mellitus reduces the ability of an individual to regulate the level of glucose in the bloodstream resulting in a number of major and some minor complications[11] Type 2 diabetes is owing to deficient insulin making from beta cells in the situation of insulin resistance. Insulin resistance, which is the inability of cells to respond adequately to normal levels of insulin, occurs primarily within the muscles, liver, and fat tissue. In the liver, insulin normally suppresses glucose release. In the setting of insulin resistance, the liver inappropriately releases glucose into the blood. The amount of insulin resistance versus beta cell dysfunction differs among individuals, with some having primarily insulin resistance and only a minor defect in insulin secretion and others with small insulin resistance and mainly a be deficient in of insulin secretion. Other potentially important mechanisms associated with type 2 diabetes and insulin resistance include the increased breakdown of lipids within fat cells, increased retention of salt and water by the kidneys, and inappropriate regulation of metabolism by the central nervous system.[11,3,4,5] However, not all people with insulin resistance develop diabetes, since an impairment of insulin secretion by pancreatic beta cells is also required.

Classification of Diabetes Mellitus

It is decisive to appreciate that Diabetes mellitus is a broad term used for a group of diseases that lead to prolonged hyperglycemia. The difference in the mechanisms for developing the different types of diabetes forms the basis of their classification.

1. **"Type 1 Diabetes Mellitus** (T1DM), previously known as insulin-dependent diabetes or juvenile onset diabetes is an autoimmune disorder that involves the destruction of the cells of the pancreatic islets".[11-4] The disease may affect people of any age but usually develops in children or young adults. populace with this form of diabetes require injections of insulin each day in organize to control the levels of glucose in their blood.

The reason this occurs is not fully understood. People with type 1 diabetes produce very little or no insulin.[12]

2. **Type 2 Diabetes Mellitus** (T2DM) is characterized by insufficient synthesis of insulin and its secretion, secondary to insulin resistance. It is normally diagnosed after the fourth decade of life and accounts for approximately 90% of all diabetes worldwide. The incidence and prevalence of T2DM are found to increase with age.[3,2,8] T2DM is divided into two subgroups, diabetes with obesity and without obesity. The obese T2DM patients usually develop resistance to endogenous insulin due to alterations in cell receptors, and this is associated with the distribution of abdominal fat. In non‑obese T2DM there is some insulin resistance at the post-receptor levels in addition to a deficiency.[2] in insulin production and release Is also called as called non-insulin dependent diabetes or adult-onset diabetes and accounts for at least 90% of all cases of diabetes. It is characterised by insulin conflict and comparative insulin deficiency, moreover or both of which may be there at the time diabetes is diagnosed. The diagnosis of type 2 diabetes can occur at any age. Type 2 diabetes leftovers undetected for a lot of years and the diagnosis is repeatedly made when a problem appears or a routine blood or urine glucose test is done. People with type 2 diabetes can often initially manage their condition through exercise and diet.[13,14]

3. **Gestational Diabetes**: Gestational diabetes mellitus (GDM) refers to the occurrence of diabetes during pregnancy and its consequent resolution at the end of the gestational period. During pregnancy and the gestational period, females go through a great deal of glucose fluctuation and often experience accelerated starvation.[2]

4. Maturity Onset Diabetes of the Young (MODY) [10] is a monogenic‑type of diabetes. It represents a very small percentage of patients with diabetes and is commonly diagnosed by the second decade of the patient's life.[2-4]

Diagnostic Criteria

The WHO meaning of diabetes "Type 1 and Type 2" is for a singl raise glucose reading with symptoms, otherwise raised values on two occasions, of either fasting plasma glucose $\geq$ 7.0 mmol/l (126 mg/dl) or with a glucose tolerance test, two hours after the oral dose a plasma glucose $\geq$ 11.1 mmol/l (200 mg/dl) A random blood sugar of larger than 11.1 mmol/l (200 mg/dL) in connection with typical symptoms or a glycated hemoglobin(HbA_{1c}) of

greater than 6.5% is another method of diagnosing diabetes.[3-7] Clinically the diabetic condition is characterised by the sustained elevation of blood glucose concentration. Glucose concentrations in diabetes frequently greatly exceed the normal upper limit. The preferred method to diagnose diabetes is based on measuring the glucose levels in the blood at the different situations detailed below:

1. Random plasma glucose ≥200 mg/dL (11.1 mmol/L).[12]

2. Fasting plasma glucose ≥126 mg/dL (7 mmol/L).[12,13]

3. Oral glucose tolerance test (a measure of plasma glucose levels 2 hr after glucose is given orally 200 mg/dL (11.1 mmol/L).[12]

The symptoms of T1DM include polyuria, polyphagia and increased thirst, loss of weight, weakness and fatigue. Additionally, patients with T2DM can display blurred vision, slow healing of sores, irritability, tingling in hands or feet and frequent infections of bladder, vagina and skin.[3,5,11]

Epidemiology of Type 2 Diabetes
International Occurrence[11]
The International Diabetes Federation predicts that the number of people living with diabetes will to rise from 366 million in 2011 to 552 million by 2030. In the United States, the prevalence of diagnosed diabetes has more than doubled in the last 3 decades, largely because of the increase in obesity. The top 10 countries in a number of people with diabetes are currently India, China, the United States, Indonesia, Japan, Pakistan, Russia, Brazil, Italy, and Bangladesh. The greatest percentage increase in rates of diabetes will occur in Africa over the next 20 years in India 35.5 million people diabetes. Type 2 diabetes mellitus in India 73.5 million people up to2030.[11-13]

Indian Scenario
Diabetes mellitus, a major lifestyle disease is doubtlessly the most ambitious public health problems of the 21st century with a universal.[4,8] The prevalence of diabetes is hurriedly rising globally. World Health Organization reports show that 32 million people had diabetes in the year 2010.[9] The International Diabetes Federation estimates the total number of diabetic subjects to be around 40.8 million in India and this is further set to rise to 69.9 million by the year 2025.[2,3] India leads the world with the largest number of diabetic subjects earning the title "Diabetes capital of the world". Diabetes, which was known to be an epidemic in urban areas have found to be increasing rapidly in rural areas too, as a result of

the socioeconomic converts. It is no longer the only disease of the elderly but is one of the major causes of morbidity and mortality dissembling youth and middle-aged people.[10] According to the Diabetes Atlas 2006 published by the International Diabetes Federation, the number of people with diabetes in India recently around 40.9 million is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken.

State Occurrence[4]

Type 2 diabetes mellitus in India. State wise occurrence Kashmir valley 6.1%, New Delhi-10.3%, Jaipur 8.6%, Mumbai 9.3%, Bengaluru-12.4%, Ernakulam- 19.5%, Thriuvananthapuram- 16.3% Chennai 13.5% 14.3%, Hyderabad-16.6%

Kolkatta 11.7%, Guwahati 8.3%.[4,13,14]

S. No.	STATE	Prevalence percentage
1	Kashmir	6.1%,
2	Delhi	10.3%
3	Rajasthan	8.6%
4	Maharashtra	9.3%
5	Karnataka	12.4%,
6	Bengal	11.7%

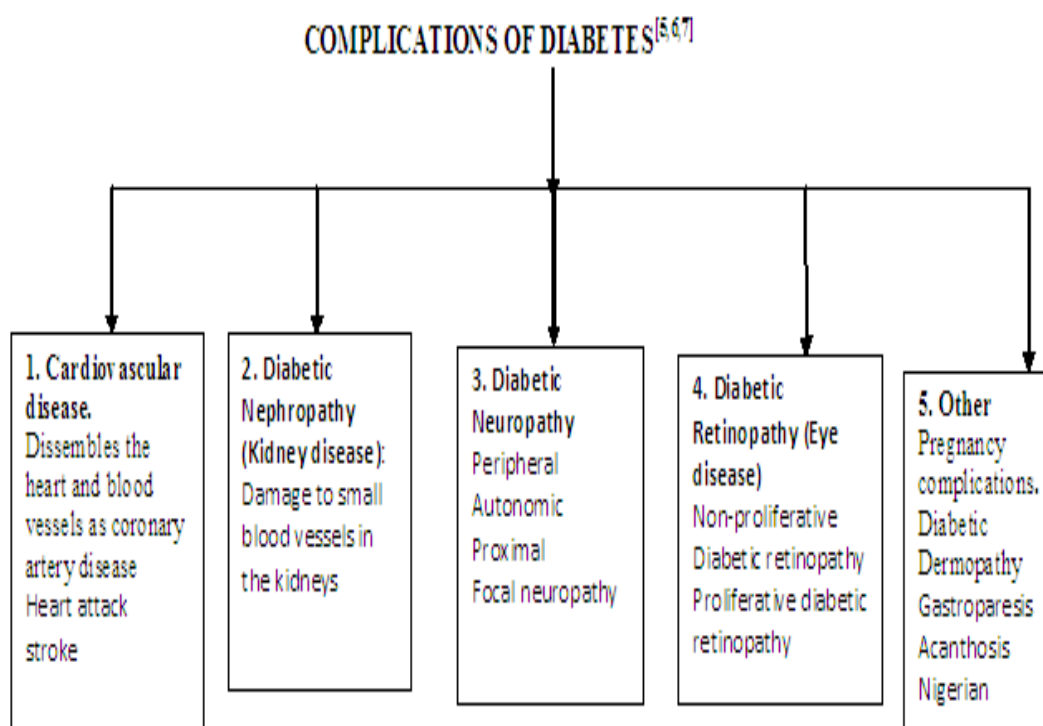**"Fig. 1:"Symptoms of Diabetes.**

"**Fig. 1" Signs and Symptoms of Diabetes[3,5,6,7]**

❖ The most common symptoms include:

❖ Increased thirst

❖ Frequent urination

❖ Weight loss

- ❖ increased hunger
- ❖ Blurred vision
- ❖ **Other symptoms include**
- ❖ Irritability
- ❖ Tingling or numbness in the hands or feet
- ❖ Frequent skin, bladder or gum infections
- ❖ Wounds that do not heal
- ❖ Extreme fatigue
- ❖ Very dry skin

Complications Of Diabetes[5,6,7]

Macro-vascular and microvascular complications (secondary to Diabetes Mellitus.) Diabetes is a chronic illness closely linked with the progress of macro-vascular complications (coronary and cerebrovascular diseases), in the arteries, and microvascular (retinopathy, neuropathy, and nephropathy) complications, in the capillaries. Shows in chart & fig 2.[5-7]

Major diabetes complications

Retinopathy — Cerebrovascular disease

Coronary heart disease

Nephropathy

Peripheral vascular disease in the lower limbs

Neuropathy

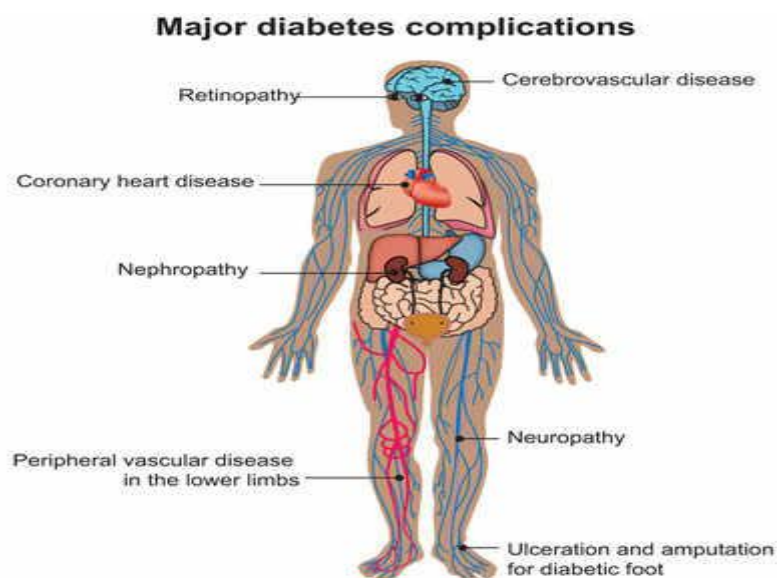Ulceration and amputation for diabetic foot

Fig. 2: Macro-vascular and micro vascular complications (secondary to Diabetes Mellitus.) Diabetes is a chronic illness closely linked with the progress of macro-vascular complications (coronary and cerebrovascular diseases), in the arteries, and microvascular (retinopathy, neuropathy, and nephropathy) complications, in the capillaries.

Risk Factors For Type 2 Diabetes[5-6]

Even though genes that dispose an person to diabetes are measured to be an essential factor in the growth of the disease, activation of a genetic predisposition requires the presence of environmental and behavioural factors, particularly those associated with lifestyle. Risk factors for Type 2 diabetes can be classified as non-modifiable and modifiable (Table 1).

Table 1: "Modifiable and non-modifiable risk factors and connected disorders for Type 2 diabetes".[5]

Modifiable risk factors	Non-modifiable risk factors
Overweight* and obesity† (central and total)	Ethnicity
Sedentary lifestyle	A family history of Type 2 diabetes
Previously identified glucose intolerance (IGT and/or IFG)	Age
Metabolic syndrome	Gender
Decreased HDL cholesterol	History of gestational diabetes
Increased triglycerides	Polycystic ovary syndrome
Dietary factors	
Inflammation	

*World Health Organization (WHO) criteria define overweight as a BMI ≥ 25 kg/m2.[50]

†WHO criteria identify obesity as a BMI ≥ 30 kg/m.

HDL, high-density lipoprotein; IFG, impaired fasting glucose; IGT, impaired glucose tolerance.

Economic Burden

Economic prospects of diabetes care currently attract considerable interest as the world diabetes epidemic takes hold and the healthcare actions of countries come under pressure to Accomplish more within cumbered resources.[16] Diabetes mellitus is a very costly disease and has profoundly deaf implications in terms of long-term microvascular and macrovascular complications and their related cost. These complications, reduce both life anticipation and quality of life.[17,18]

The World Health Organization's World Health Report in 2012 pointed out that 60% of the Burden of diabetes and other chronic diseases occur in the low and middle-income countries. It is only in the low-income countries where the deaths attributed to communicable and non-communicable disease is similar to in number and these countries conflict with a double burden of disease. In the middle income and upper-income countries, non-communicable diseases are responsible for the largest burden of diseas.[5] In India, a recent study showed that total annual costs by patients on diabetes care were,on average, INR 'Indian Rupee value' 10,000 in urban areas and INR 6,260 in rural areas. An increase of 113% was observed in the total expenditure between 2003 and 2012 in the urban population. Low-income groups spent a higher proportion of their income for diabetes care [34% and 27% for urban poor versus rural poor respectively] without subsidies. The medical expenses incur by an individual with diabetes are 2to5fold elevated than individuals incurred by populace without diabetes. The average expenditure per patient per year would be a minimum of INR 4,500. Therefore, the estimated annual cost of diabetes care would be approximately 180,000 million rupees.[10,19,20] In India, estimates suggest that 85-95% of all healthcare costs are borne by individuals and their families with household income Year-on-year increases in this proportion are greater in impracticability groups, worship with duration of diabetes, the presence of complications, hospitalization, surgical therapy and glycemic control requiring insulin.[26-29]

DM way a vast financial load with effects to health structure costs, indirect costs arising from losses occasioned by patient disability and premature mortality, time spent by family members accompaniment patients when attempting care, and intangible costs in terms of psychological pain to the family and loved ones. The effectiveness of prevention and control

of those illnesses relieve largely on the performance of pharmacist by pharmaceutical care program.[30]

Management of Diabetes Mellitus

The main aim in the management of diabetes is to maintain blood glucose levels as close to normal as possible while avoiding hypoglycemia. In order to attain this, there are five tools involved in diabetes treatment which are education, exercise/activity, diet, oral medications and/or insulin, often used in combination. Healthy lifestyle choices including diet, exercise and weight control provide the foundation for managing type 2 diabetes. However, you may need medications to achieve target blood sugar (glucose) levels. Sometimes a single medication is effective. In other cases, a combination of medications mechanism better.[13,17]

Diabetes Treatment

Lowering blood sugar

Several classes of type 2 diabetes medicines exist. Each works in different ways to lower blood sugar. A drug may work by

- Stimulating the pancreas to produce and release more insulin
- Inhibiting the production and release of glucose from the liver
- blocking the action of abdomen enzymes that break losing carbohydrates
- Improving the sensitivity of cells to insulin

Each class of medicine has one or more drugs. Some of these drugs are taken orally, while others must be injected. And some type 2 diabetes pills contain a combination of two classes of drugs Oral Hypoglycemic Agents Sulfonylurea, metformin gliclazide, glimepiride, glibenclamide, and the older agent's chlorpromazine and tolbutamide. Reduce insulin resistance Biguanides:-metformin, phenformin, buformin. α -Glucosidase inhibitor. Thiazolidinediones currently available are rosiglitazone, pioglitazone and troglitazone.[3,13,17,21]

Patient Education[13]

People with Type 2 Diabetes Mellitus have to presumably responsible for the day-by-day control of their condition. The aim of education for people with Diabetes Mellitus is to progress in their knowledge and skills, enable them to take control of their own condition. Education should help in achieving improvement in control of blood glucose, blood lipids

and blood pressure, management of diabetes-associated complications and QoL. This is possible by pharmaceutical care.[13]

Dinesh K.U et al in Nepal 2011 study was to assess the knowledge, attitude and practice of diabetics, drug prescribing pattern, and the impact of pharmaceutical care program on glycemic control, direct cost involvement and patient satisfaction Evaluated for their diabetes Knowledge, Attitude and Practice (KAP), and satisfaction level by administering the KAP and satisfaction questionnaires at baseline and after two months post-intervention A result from the positive effect of pharmaceutical care program amongst diabetics in provisions of their "KAP" improvement. Improvement in the glycemic control and decrease in the prescription cost and economic burden was found which increased the overall patients' satisfaction.

Definition of Pharmaceutical Care

In 1990 Hepler and Strand published the first practical definition of pharmaceutical care. They write, 'Pharmaceutical care is the responsible provision of drug therapy for the purpose of achieving definite outcomes which improve a patient's quality of life'.[5,9]

Pharmaceutical care Functions

1. "Recognize a patient's actual and potential drug-related problems".
2. "Resolve the patient's actual drug problems".
3. Prevent the patient's potential drug-related problems.

The PC chart is a written, individually; comprehensive medication therapy plan based on evidently defined therapeutic goals.

Principal Elements.[4-15]

Pharmaceutical care involves not only medication treatment the "actual provision of medication" but also decisions about medication use for individual patients As appropriable. Toward pharmaceutical care the pharmacist participate singular knowledge and skills to ascertain optimal outcomes from the Use of medications. In pharmaceutical care, the unit of care is one pharmacist in a direct professional relationship with one Patient.Pharmaceutical care is the responsible provision of drug therapy for the purpose of to improve an individual patient's quality of life from first to the last achievement of definite medication-related therapeutic outcomes.[5]

1. Cure of a patient's disease.

2. Elimination or reduction of a patient's symptomatology.

3. Arresting or slowing of a disease process.

4. Prevention of a disease or symptoms.

Areas

- Disease state management

- Clinical interventions (refusal to dispense a drug, recommendation to change and/or add a drug to patient's pharmacotherapy, dosage adjustments, etc)

- Professional development

- Pharmaceutical care

- Extemporaneous pharmaceutical compounding

- Communication skills

- Health psychology

- Patient care

- Drug abuse prevention

- Prevention of drug interaction, including drug-drug interactions or drug-food interactions

- Prevention (or minimization) of adverse events

- Incompatibility

- Drug discovery and evaluation

- Detect pharmacotherapy-related problems, such as

1) A patient is taking a drug which he/she does not need

2) A patient is taking a drug for a specific disease, other than one affliction the patient

3) A patient wants a drug for a specific disease but is not receiving it

4) A patient is captivating a drug underdose

5) A patient is taking the drug overdose

6) A patient is having an adverse effect on a specific drug

7) A patient is suffering from a drug interaction

Management of Type 2 Diabetes Mellitus by Pharmaceutical Care

Procedures for Providing Patient- Pharmaceutical Care

The steps in providing pharmaceutical care include recognized a 'professional' 'therapeutic' relationship the pharmacist should welcome and understand with the patient. This will allow the patient to open up to the pharmacist. It is followed by a collection of patient-specific

"subjective and objective" data; sources of patient data include patient interview, interview of other caregivers and patients' relatives, laboratory report, medical records review, and physical evaluation. Evaluation of patients' data and identification of health, and drug therapy problems using significant thinking and problem figuring out skills, which helps to carry out the evaluation process, is an important aspect of pharmaceutical care. This is followed by developing and implements pharmaceutical care plans. The written plan should indicate patient-specific goals. Goals should be specific, achievable, measurable, and reliable with professional responsibilities. The pharmacist evaluates the interventions and follow-up while assessing whether the interventions improved patient outcomes. It helps the pharmacist to know whether the management plan should be familiarized. The final stage is documentation and follow-up. This involves the recording of all activities that have been undertaken. It helps in proper follow-up, and audit trail of patients. It is also a way of promoting the generation of data needed for research and development in pharmaceutical care and related areas.[3,5]

Philosophy of Pharmaceutical Care program

PC explains what all practitioners should uphold. According to this philosophy, the practitioner performs the following:

- Takes responsibility for meeting society's need to reduce DTPs.

- Employs a patient-centred approach that addresses all the patient's drug-related needs.

- Establishes a caring therapeutic relationship with individual patients.

- Assumes a clearly defined set of responsibilities that direct patient care activities.[3,7]

Patient Care Process

The process of helpful for patients explains the key processes involved in patient care and the duties of the practitioner in the practice. It involves patient review, formulation of the care plan, a continuity of care and noting down of all activities carried out. The activities are shown in Figure 3.

The 'pharmacists' pharmacotherapy workup is a tool available to practitioners that give out as a guide through the steps of the patient care process. It offers a standardized format for competent documentation of patient-specific information needed for a financially viable pharmaceutical care practice.[2-5]

Patient Assessment

Patients are continually reviewed to ensure that they get the finest benefit from their medication therapy while minimizing drug-related problems (DTP). DTP is an undesirable event involving drug therapy, which can affect the desired patient outcome. Seven major types of drug-related problems have been identified that relate to the appropriateness, effectiveness, safety, and convenience of drug therapy. There are multiple potential causes of each type of problem. Drug therapy problems drive following steps in the patient care process. Therefore, they are clearly confirmed and with a high level of specificity. Moreover, they are prioritized according to their degree of urgency as determined by the severity of potential harm to the patient21. Many relationships exist between drug-related needs and DTP.[22]

Pharmaceutical Care Plan

PC plan is targeted at eliminating every form of DTP or preventing them from occurring in the first place.[23] It involves collaboration between patients and clinicians. Follow-up evaluation is essential in PC plan and process. The following processes are involved in follow-up evaluation process. Determination of the actual outcomes that were achieved by the plan and assessment of the extent to which the plan has achieved the desired outcomes. Others are to determine if there are new or changing drug therapy problems that must be address and exploration of the factors predisposed patients to DTPs.[23,24]
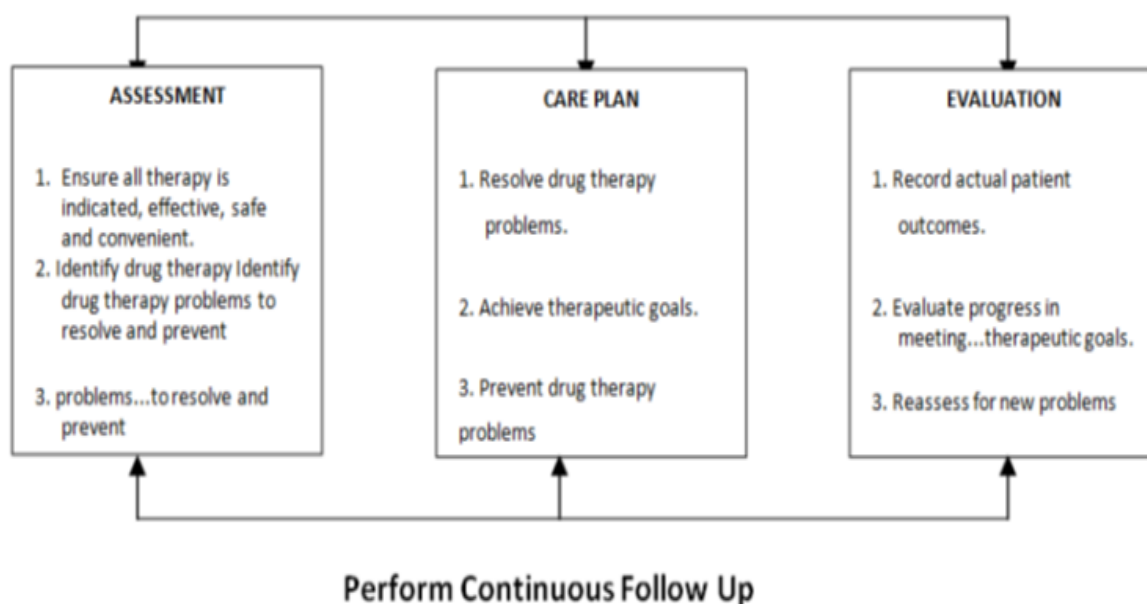
"Fig. 3:"The patient care process within a pharmaceutical care practice (Adapted from Cipolle *et al* 1998).[19]

The position of each medical condition can be described according to the following categories

Resolved: the goals have been accomplished and therapy is completed.

Stable: the goals have been accomplished, but continue the same therapy.

Improved: progress is being made toward achievement of the goals, therefore continue the same therapy.

Partial improvement: advancement is being made, but minor adjustments in the therapy are required.

Unimproved: there is no measurable improvement yet, but continue the same therapy.

Worsened: there is a refuse in health, so revise the therapy accordingly.

Failure: the goals are not attainable with the present therapy, thus initiating new therapy.

Expired: the patient died while receiving drug therapy.[19]

As per the WHO recommendations 1992, every healthcare administration including community and hospital pharmacy must know about good pharmacy practices and this strategy highlight the provision of pharmaceutical care. The general practices of pharmacists include following standardized methods.[2,13]

1. Collecting and arranging specific information about patients.
2. Identifying the probable medication therapy problems.
3. Enlisting patient's health care needs.
4. Specifying pharmacotherapeutic goals.
5. Designing the drug therapy regimen.
6. Preparing a specific monitoring plan.
7. Developing a specific drug therapy regimen in coordination with patient and other health care team members.
8. Monitoring the effects of drug therapy regimens.
9. Redesigning and monitoring the drug therapy regimens and plans.
10. Recommending the physician in selecting the right drug.

Pharmacists play the vital role in solving such health care problems presented by composite health care system. Several pharmaceutical cares programmed have been established in many countries to enhance clinical outcomes and improve health care system. These programmed are successfully implemented by pharmacists. Though, such effective programmed do not exist in the Indian situation. It is growing to bring down the effective pharmaceutical care system in present Indian health care system. India is country with major problems in use of medications due to lack of clinical pharmacy services and this is again because of vast resistance on part of medical professionals to accept the role of pharmacists in clinical aspects as well the unwillingness of pharmacists themselves towards assuming such clinical role and responsibilities. Though, this discouraging scenario has started changing slowly in India and many hospitals have started clinical pharmacy and pharmaceutical care services with significant positive results.[5-9] At present, type 1 diabetes cannot be prohibited. The ecological triggers that are consideration to produce the process that results in the destruction of the body's insulin-producing cells are still under investigation. There is a lot of evidence that lifestyle changes "achieving a healthy body weight and moderate physical activity, can help discontinue the development of type 2 diabetes.

The main goals in the management of DM2 should be as follows
- Fasting blood glucose of 4-6mmol/L
- Glycosylated haemoglobin (HbA1c) <7%
- Blood pressure <130/80mmHg
- Total cholesterol <4.0mmol/L
- Body Mass Index (BMI) of <25kg/m2 where practicable
- Cigarette consumption of zero
- Alcohol intake of < two standard drinks per day for men and one for
- Women
- >30 minutes walking or alike five or more days per week

The main goals in the management of DM2 should be achieved by

Lifestyle interventions: be an important characteristic of the management of DM. they are significant for good glycaemic control.[3,14,30,31,32]

Dietary advice: reducing the ingestion of foods with the high energy density (i.e. those high in fat). DM2 is linked with a high incidence of cardiovascular disease, making a reduction in saturated fat is a significant goal for all patients.[3,4]

Physical activity and exercise: Physical activity is one of the main pillars in the prevention of diabetes. Regular exercise reduces cholesterol levels, lowers blood pressure, and augments weight-reduction increased insulin sensitivity, improved body composition and psychological well-being.[3,4]

Smoking Cessation

Smoking is a recognized risk factor for cardiovascular and other diseases. Advice regarding smoking termination should be given to every person with DM2 who smokes. Smoking increases abdominal fat accumulation and insulin resistance. All smokers should be confident to stop smoking. It is valuable to stop smoking at any age.[3,4]

Obesity: predominantly abdominal obesity is associated with the development of type 2 diabetes. Weight loss improves insulin resistance and reduces hypertension. People who are overweight or obese must, therefore, be confident to achieve and maintain a healthy body weight.[3,4]

Balanced and nutritious diet is essential for health. A fit diet reduces risk factors for cardiovascular diseases.[3,4]

Stress and depression: There is evidence of an association between depression and both diabetes and cardiovascular disease.[3,4]

Sleeping patterns: Both short (<6h) and long (>9h) sleep durations might be related to a higher risk of developing type 2 diabetes. Sleep lack may impair the balance of hormones regulating food intake and energy balance extended sleep durations may be a sign of sleep-disordered breathing or depression and should be treated correctly. There is also a close involvement between obesity and obstructive sleep apnoea syndrome the most common form of sleep-disordered breathing.[3,4,13]

Things to accomplish Every Day for good quality Diabetes Care

Follow the healthy eating plan that you and your doctor or dietitian have worked out.

Be active a total of 30 minutes exercise most days. Ask your doctor what activities are best for you.

Take your medicines as directed.

Check your blood glucose all day. Each time you check your blood glucose.write the number in your record book.

Check your feet every day for cuts, blisters, sores, swelling, redness, or sore toenails.

Brush and floss your teeth every day.

Control your blood pressure and cholesterol.

Don't smoke.

Table 2: Activities of pharmaceutical care services.[2,3,4,5]

Category	Activities
Health promotion	Smoking cessation
	Emergency hormonal contraception
	Dealing with infestations
	Dietary advice
	Sun and skin protection
Medicine therapy management	Medicine review
	Provision of drug information
	Improving adherence
	Detecting adverse drug events
	Providing education
Preventive care services	Diabetes prevention
	Osteoporosis screening/prevention
	Weight management
	CHD prevention and management

Pharmacist Education[1,17]

The qualified pharmacist in coordination with other health care group works to prevent disease and to assess, monitor, initiate and modify the use of medication in order to ensure safe and effective drug therapy regimens. This system is documented as a patient-focused, outcome-based pharmaceutical care or pharmacy practice. This system is mainly aimed to optimize the patient health and to accomplish positive clinical outcomes through the active involvement of clinical pharmacists in healthcare organizations. The active involvement of clinical pharmacists in India in this regard is not up to the expected mark is contrary to trends in developed countries. In present-day healthcare trend usage of multiple drugs in drug therapy is common practice and raised the complexity of drug interactions and similar problems. To address such situations and solve the possible problems, the existence of pharmaceutical care system in Indian healthcare organizations is of urgent need. In a

European country, people who have received training in clinical pharmacy usually 'pharmacists and sometimes clinical pharmacologists' have most of the knowledge and skills necessary to carry out pharmaceutical care to examine a given patient's drug use, to prevent, detect or correct drug-related problems, and to improve therapeutic outcomes and confidently QOL. In several European countries, however, having a pharmacy degree is not enough and a special qualification is required for the provision of pharmaceutical care. For instance, in India, much importance is placed on post-graduate education. In the UK, it has newly been recognized that participation in postgraduate education has a positive impact on the practice activities of community pharmacists and so continuing education is spring to become mandatory.[14,32,34]

Importance of pharmaceutical care[2]

The application of unique knowledge and skills of the pharmacist to improve the health of the people is called pharmacy practice. It includes hospital, clinical and community pharmacy. Practicing pharmacist share tasks with other healthcare professionals doctors, nurses etc and with patients for the outcome of therapy. The patient and the community are the primary beneficiaries of the pharmacist's actions. Pharmaceutical care program is the responsible provision of drug therapy for to control the definite disease outcomes those recover a patient's "quality of life." The outcomes of treatment are: treat of disease, decline of symptoms, slowing a disease process, preventing a disease or symptoms.

Comprehensive Pharmaceutical Care

The effects of comprehensive pharmaceutical care have been studied especially in the elderly and nursing home populations of Europe. A major international study was conducted at the end of then the fields of drug use evaluation, indicators for unfortunate prescribing, and drug-related problems and their severity. Such studies can provide a more general view on the possible impact of comprehensive pharmaceutical care. A major problem in India is the incompleteness of patient data in the electronic patient records of community pharmacies.[1,17,19]

Disease Oriented Pharmaceutical Care[1]

It is considered easier for pharmacists and their staff to provide disease-oriented pharmaceutical care than comprehensive pharmaceutical care, but in Europe, there is an ongoing argument about whether it is morally permissible to limit the provision of pharmaceutical care to groups of patients with certain characteristics and to not provide

pharmaceutical care to others HIV/AIDS. Since (almost) full adherence is so important in the use of highly active antiretroviral therapy. In Switzerland, adherence has been studied using the electronic medication event monitoring system. From that study, it is clear that resistant hypertension is usually caused simply by deprived adherence. The results were not compared to a doctored clinic, but the applied interventions certainly resembled pharmaceutical care. Coronary Heart Disease Very few studies have been conducted in this important field. An early study of congestive heart failure in Northern Ireland showed that as a result pharmaceutical care patients significantly improved their knowledge of their drug therapy and showed improved outcomes. Furthermore, the intervention group had fewer hospital admissions than the controls. In India, More research is needed into the exact role of pharmacists and pharmaceutical care in this field. Diabetes Studies of the effect of pharmaceutical care on diabetes were carried out in several countries. In Portugal and Germany, a diabetes service has been implemented. Wermeille et al. developed a pharmaceutical care model for Type 2 diabetes in Switzer- land. Many pharmacies in India now provide support for self-monitoring and check blood- sugar meters regularly. Diabetes clearly is a field in which pharmaceutical care is valuable Lipid Management. Most studies into lipid management in Europe are parts of other pharmaceutical care research into conditions like diabetes or hypertension. Asthma Many studies into the effect of pharmaceutical care for asthma patients in community pharmacies have been conducted in a number of countries, including Denmark, Finland, Germany, Malta, Northern Ireland.[1,2,13,14,20]

Pharmaceutical care program control patient outcomes

Pharmaceutical Care program control other clinical outcomes, significant reductions were reported in six of ten studies that measured body mass inde.[40,44,47] in six of seven studies that measured fasting or random blood glucose,[37,40,41,43,44,47] in six of ten studies that measured systolic blood pressure,[37,40,43,45,49] and in four of ten studies that measured diastolic pressure.[37,43–45] Of the nine studies that measured lipids, five reported reduction in total cholesterol, [11,43,45,48,49] three in low-density lipoprotein cholesterol[43,48,49] and high-density lipoprotein cholesterol,[43,44,48] and four in triglycerides.[11,36,43,48] Positive impacts on other humanistic outcomes included improvements in knowledge,[43,44] safety, Medication Adherence,[33,34] and service satisfaction.[34,41,46,48]

Implications for patient management

Chronic disease management of T2DM requires a mix of the plan that conveys optimum pharmacotherapy, patient education, and self-management support to the patient over the course of their disease. To accomplish treatment targets required to prevent complications and maintain a good QoL for the patient, a team approach is needed, and pharmacists by the good quality of their convenience, medication expertise, good relationship, and frequent contact with patients should become active members of the diabetes care team.

CONCLUSION

Type 2 Diabetes mellitus account for 90-95% of those with Diabetes mellitus Is also called as non-insulin Dependent diabetes mellitus, type II diabetes or adult-onset diabetes. Both genetic and environmental factors have been occupied in the aetiology of Type 2 Diabetes mellitus. The risk factors for the disease are older age, obesity, family history and lower "socioeconomic" status. Type 2 Diabetes mellitus is heterogeneous disorder Glucose toxicity appears to give most to the development and progression of microvascular complications, which include retinopathy, nephropathy and neuropathy. Disease Impact the socio-Economic and public health impact of Type 2 Diabetes mellitus on both individuals and society is ever growing. the complications of Type 2 Diabetes mellitus are also likely to have significant effects on the Patient's health-related quality of life (HRQoL), the long-term complications have a damaging effect on quality of life (QoL). based on literature survey we conclude that The burly reason behind increased percentage of Type 2 Diabetes mellitus in India is low down literacy rate, deficiency of public awareness, lack of attentiveness and understanding for diabetes, lack of advanced healthcare facilities, little socioeconomic status and inactive lifestyle. These factors may increase the diabetes incidence in the country which can lead prescription overload and irrational drug prescribing. Therefore Diabetes is a disease that needs more pharmacist involvement.Pharmacists could contribute to such programs through pharmaceutical care (PC). This Pharmaceutical care (PC) study will improve the quality of life (QOL), "health-related quality of life"(HRQOL). Pharmaceutical care is the direct, responsible provision of medication-related care with the purpose of achieving definite outcomes that improve a patient's quality of life in type 2 Diabetes mellitus. There is a forthcoming need for urgent relative research, immediate health policy reorganization and implementing inexpensive intervention with pharmaceutical care sincere efforts to diminish the potentially terrible increase in diabetes that is predicted for the upcoming years.

COMPETING INTERESTS

The author declares that he has no competing interests.

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