

Type 2 Diabetes Medication Management: The Pharmacist's Involvement

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Abstract: *The increasing prevalence of diabetes mellitus (DM) is a major social and economic problem for nations across the world. Current diabetes treatments are fraught with serious side effects and have not yet effectively addressed the illness's underlying causes. Therefore, new approaches to managing the condition are developing quickly. Hence, this narrative review aims to investigate various treatment plans for diabetes control and the difficulties that come with them. Data shows that nanotechnology, gene therapy, stem cells, medical nutrition therapy, and lifestyle change are therapeutic regimes promising in managing DM. Problems with these methods include a need for an efficient delivery system, safety concerns, ethical considerations, and the optimization of glycemic, lipid, and blood pressure modulation to reduce complications. Other issues include improving patients' compliance with lifestyle and pharmacologic interventions. The development of an efficient and risk-free clinical treatment plan depends on the integration of lifestyle management with pharmaceutical treatments and the optimization of these procedures.*

Keywords: Diabetes mellitus, hyperglycemia, Insulin, patient compliance

1. Introduction

Diabetes mellitus is a collection of metabolic disorders marked by persistent high glucose levels in the blood due to issues with insulin production, insulin function, or both. Insufficient insulin levels or insulin resistance in target tissues such as skeletal muscles, adipose tissue, and liver, at the level of insulin receptors, signal transduction system, and effector enzymes or genes, are the causes of these metabolic issues. Some diabetic patients with type 2 diabetes may not show symptoms in the early stages of the illness. In contrast, others, particularly children with severe hyperglycemia and absolute insulin shortage, may have symptoms such as polyuria, polydipsia, polyphagia, weight loss, and impaired vision. [1]

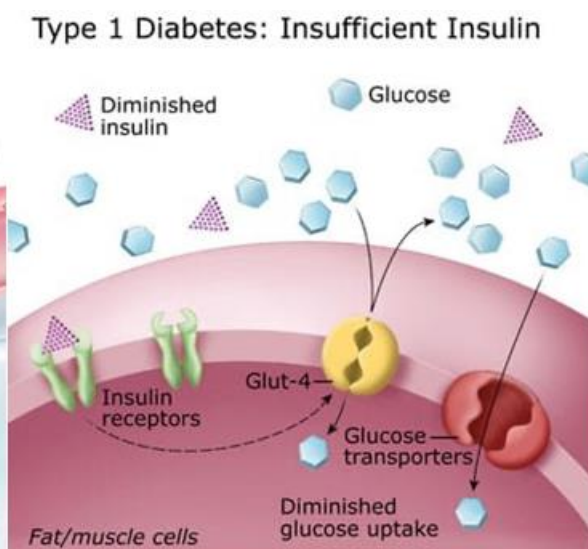
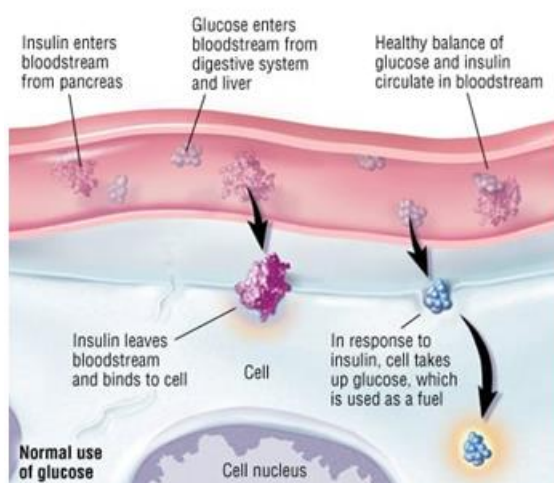
Classification of Diabetes Mellitus

DM is categorized according to the pathogenic mechanisms that induce hyperglycemia due to an absolute or relative insulin deficiency. About 85% to 90% of people with diabetes have type 2 diabetes, whereas only about 5% to 10% have type 1 diabetes, which is due to the destruction

of beta cells of the pancreas. [2]

Type 1 diabetes mellitus usually manifests in young people and is generally diagnosed before the end of adolescence (hence the name "juvenile diabetes"). These people tend to be on the thinner side. [3] Symptoms of type 1 diabetes in children and adolescents can include polydipsia, polyuria, enuresis, extreme tiredness, polyphagia, rapid weight loss, wounds that heal slowly, infections that recur, blurred vision, severe dehydration, and diabetic ketoacidosis. The disease can develop abruptly. Symptoms of type 1 diabetes in children and adolescents can include polydipsia, polyuria, enuresis, extreme tiredness, polyphagia, rapid weight loss, wounds that heal slowly, infections that recur, blurred vision, [4] severe dehydration, and diabetic ketoacidosis.

The disease can develop abruptly. Patients with type 1 diabetes may have an adjustment period—a period of relative independence from insulin—that may last anywhere from a few weeks to a few months or even years. If their levels decrease to that level,



Type 2 Diabetes: Insulin Resistance

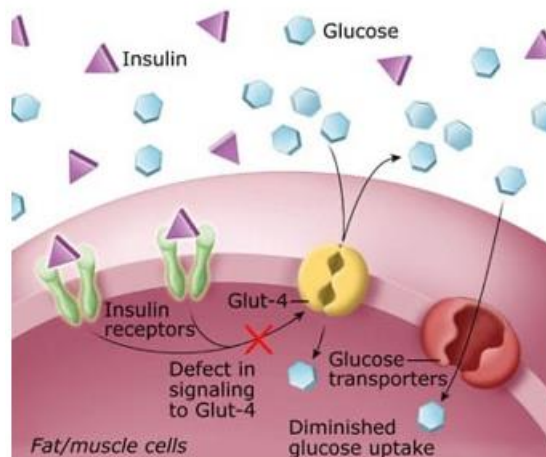


Figure 1: Classification of DM [4]

it is possible to temporarily discontinue insulin treatment in some children without observable hyperglycemia insulin needs. [6]

Type 2 Diabetes is an intricate and advancing illness distinguished by diverse metabolic abnormalities and impacting numerous organs. The primary factors contributing to the onset of type 2 diabetes are compromised insulin production and insulin resistance in peripheral tissues, including adipose tissue, muscle, and the liver. The progressive deterioration of pancreatic beta-cell function causes a reduction in insulin production. It is also associated with a decrease in beta-cell mass, noticeable before developing type 2 diabetes. [7] [8]

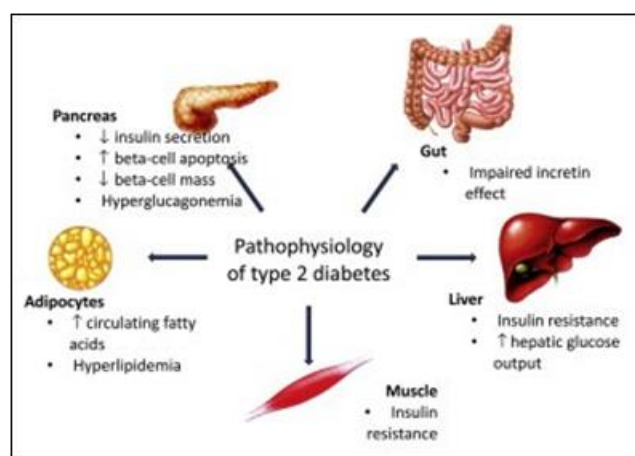


Figure Pathophysiology of type 2 diabetes. [9]

Statistics

According to estimates, there are around 463 million individuals living with diabetes in 2019, which accounts for 9.3% of the worldwide adult population aged 20 to 79 years. The projected figure is anticipated to rise to 578 million (10.2%) by 2030 and 700 million (10.9%) by 2045. In 2019, the projected prevalence of diabetes in women is 9.0%, while in males it is 9.6% (as shown by age group in Figure 1). The prevalence of diabetes increases with age, resulting in a prevalence rate of 19.9% (111.2 million) among those aged 65-79 years. [10]

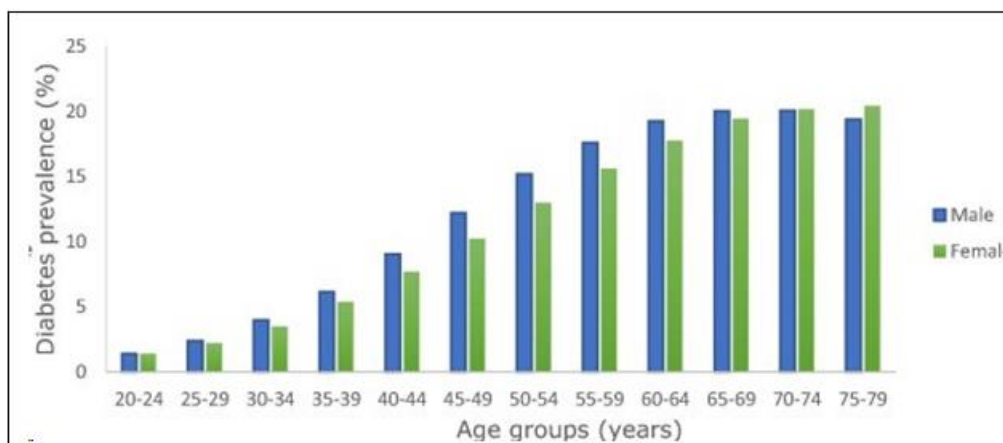


Figure: Diabetes prevalence by age and sex in 2019. [10]

Table 1: Blood glucose and hemoglobin A1c levels

	Blood Glucose Fasting (mg/dl)	Blood Glucose 2 hours after eating (mg/dl)	Hemoglobin Alc (%)
Normal	80- 99	120- 140	5.7 or below
Prediabetes	100- 125	140- 160	5.7- 6.4
Diabetes	126 or above	200 or above	6.5 or above

Role of Pharmacist in Diabetes Mellitus

Pharmacists are the third most populous health profession globally, [11] behind physicians and nurses. Most pharmacists are employed in community settings, while a minor percentage work in hospital pharmacy, academia, industry, and research. Community pharmacies offer a variety of products, including prescription and nonprescription medication for diabetes, blood glucose meters and testing strips, needles and swabs, and dietary supplements. They also provide services such as unit dose dispensing, medication review, point-of-care testing, and disposal of unwanted medicines. Community pharmacists are often regarded as the most easily accessible healthcare practitioners since they do not need consultation appointments and interact significantly with patients. Therefore, they are in a favorable position to impact the treatment of individuals with T2DM substantially. Type 2

diabetes mellitus (T2DM) is the primary factor responsible for the significant impact of diabetes on a global scale, affecting as many as 90% of individuals with diabetes worldwide.

Pharmacy-based therapies have been extensively studied globally to assess their efficiency in assisting individuals with Type 2 Diabetes Mellitus (T2DM). Most of the research has been undertaken in industrialized Western nations, focusing on the United States of America.

Nevertheless, instances may be seen worldwide, including in the United Arab Emirates and Hong Kong. However, more research needs to be undertaken in low- and middle-income nations such as Nigeria, Iran, India, Brazil, Thailand, Jordan, Iraq, and Malaysia. The variety of therapies assessed is listed in Table 1.

Components of pharmacist interventions evaluated in the T2DM [12]

Stage	Intervention	Component
Treatment plan/review	Medication review	Medication review Interventions based on patient outcomes (pharmacotherapy follow-up)
Patient education	Patient education/consultation	Disease process Goal setting Lifestyle: physical activity, diet Medication Psychosocial support: patient health beliefs SMBG: blood glucose meters Prevention/treatment of complications: foot care, smoking cessation, hypertension, dyslipidemia Unspecified /customized content (ie, education program tailored to patient's prior knowledge) Patient self-management services
Monitoring	Monitoring treatment outcomes	Review of blood glucose results Physical examination (blood pressure, weight, feet, skin) HbA1c measurement
Other	Monitoring compliance Partnership with other health professionals	Adherence questionnaire Liaison with the prescribing doctor Referral for patient education Referral to a specialist nurse Referral for medical advice

Pharmacists play a vital role in the treatment of diabetes mellitus, covering several essential aspects that highlight their significance in both the healthcare system and the lives of individual patients with diabetes. Their engagement spans from providing direct care to patients to collaborating with other healthcare professionals, maximizing treatment results, and improving the quality of life for those with diabetes. Pharmacists make substantial contributions in the following essential areas:

Drug Management and Optimization: Pharmacists with pharmacotherapy are crucial in managing and optimizing drug regimens for patients with diabetes. Optimizing treatment in individuals with diabetes is a complex therapeutic endeavor that involves extensive patient education and determination. The objective is to enhance glycemic regulation while avoiding undesirable weight gain or hypoglycemia and achieving a favorable or neutral impact on lipid levels and blood pressure controls. Effective drug

selection is choosing the medication that is most likely to enhance power and least likely to result in interactions, unpleasant effects, or adherence issues. As a result, it has the potential to alter the future of patients and impact the expenses of healthcare systems. [13]

Patient Education and Counseling: Education plays a fundamental role in treating diabetes. Pharmacists play a crucial role in providing essential information about the functioning of pharmaceuticals, their potential adverse effects, and the significance of diligently following recommended treatments. In addition, they guide patients about self-monitoring blood glucose levels, using tools such as glucometers and insulin pens and analyzing the results to make well- informed healthcare choices.

Lifestyle Modification Support: Besides medicine, lifestyle modifications are crucial for effectively controlling diabetes mellitus. Pharmacists provide guidance and assistance about

food, exercise, maintaining a healthy weight, and quitting smoking. They collaborate with patients to establish and uphold lifestyle adjustments that may effectively manage blood glucose levels and mitigate the likelihood of problems.

Pharmacists oversee the overall diabetes management by closely monitoring the course of the illness and evaluating the efficacy of treatment options. Their role involves assessing patient outcomes, promptly detecting problems, and collaborating with other healthcare experts to make therapeutic modifications to achieve optimum illness management.

Interprofessional Collaboration: Treating diabetes requires the collective effort of several healthcare providers. Pharmacists work with doctors, nurses, nutritionists, and other professionals to provide a unified and thorough approach to patient care. Their important insights improve the overall success of the diabetes management strategy by boosting drug treatment and patient counseling.

Prevention and Screening: Pharmacists contribute to preventing and identifying diabetes by conducting community health screenings and organizing educational programs. They can identify patients at a high risk of acquiring diabetes and guide preventative actions. In addition, they offer immunizations especially crucial for patients with diabetes, such as influenza and pneumonia vaccines, to avoid infections that might worsen the disease.

Pharmacists can play a role in advocating for better diabetes treatment and improving access to essential drugs and supplies by participating in advocacy activities and policy reform. One way to influence health policy is by advocating for procedures that promote the efficient treatment of diabetes and actively engaging in research and quality improvement activities.

2. Conclusion

When it comes to providing people with diabetes with the care and support they need, pharmacists play an essential and multi-faceted role in diabetes management. By managing medications, educating patients, advising on lifestyle choices, and keeping tabs on disease progression and drug effectiveness, pharmacists play an essential role in the all-encompassing treatment of diabetes. Their extensive knowledge of pharmacology enables them to personalize drug regimens for each patient, maximizing therapeutic efficacy while reducing adverse effects.

In addition to dispensing medicine, pharmacists have an important educational role by teaching patients about their disease, coping mechanisms, and the significance of taking medications as prescribed and making other lifestyle changes. They may encourage patients to actively manage their health by offering essential nutrition, exercise, and glucose monitoring advice. In addition, pharmacists may work with other medical professionals to provide a unified strategy for patient care by spotting possible medication interactions, managing polypharmacy, and suggesting treatment changes.

In addition, by providing services like blood glucose testing and advising on preventative measures, pharmacists help screen and identify diabetes and its consequences. The fact that they are actively involved in diabetes awareness campaigns and community health initiatives shows how seriously they take public health and prevent diabetes-related problems.

Finally, pharmacists provide complete care beyond administering medicine, making them essential healthcare team members in diabetes treatment. Their invaluable contribution highlights the importance of tackling the obstacles associated with this chronic illness by improving pharmaceutical safety, patient outcomes, and patients' ability to manage their diabetes properly.

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