



Tirzepatide:- To Improve Blood Sugar Control in Diabetes In Addition Of To Diet And Exercise

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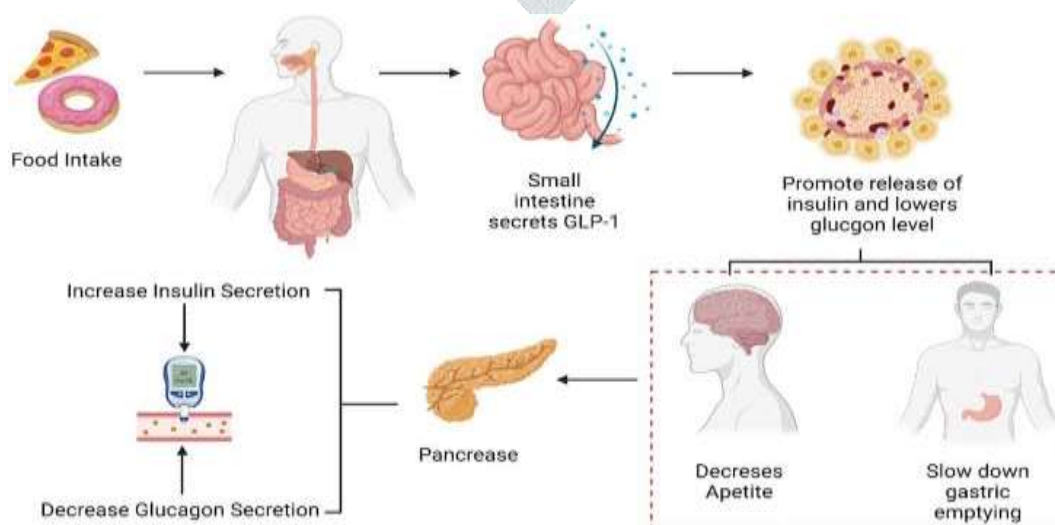
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ABSTRACT:-

The prevalence of Type-2 diabetes is an increasing global problem. Especially in developed countries and is re\ered as twin epidemics. Such as, Advanced treatment approaches are needed. Tirzepatide developed by eli lily was under the brand name 'mounсарo' by the united states Food Drug administration (FDA) in may 2022.



Tirzepatide, sold under the brand name mounjaro is medication. Used for the treatment of type-2 diabetes. Tirzepatide is given by the weakly subcutaneous injection (under the skin). Common side effects may include like (Nausea, vomiting ,diarrhea,Constipation, abdominal) discomfort and abdominal pain. The type -2 diabetes drug tirzepatide has been reported to induced weight loss in patients with diabetes.

KEYWORD:-

tirzepatide, twincretin, short peptide, incretins, diabetes, obesity

INTRODUCTION AND BACKGROUND:-

The Food and Drug Administration (FDA) has approved a novel diabetes drug called tirzepatide[1]. It is the first of its kind to function as a dual-agonist of the glucagon-like peptide 1 (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP) receptors.[2,3] The term "twincretin" was introduced by Finan et al. to denote their combined effect on insulin secretion. [2,3] Following a meal, plasma concentrations of GLP-1 and GIP rise, activating their receptors on pancreatic cells to trigger a glucose-dependent, proportionate insulinotropic response that aids in the removal of the absorbed carbohydrate and fat load.[4,5] Tirzepatide offers the advantages of lowering glycosylated hemoglobin (HbA1c), weight loss, cardiovascular health, a normal lipoprotein profile, and improvement in nonalcoholic steatohepatitis (NASH). [6,7] It is a good substitute for the incretin effect in glycemic control, as this impact is diminished in diabetes. The efficacy of tirzepatide at different doses has been evaluated in a number of clinical trials with other medications that are currently on prescription, such as metformin, semaglutide, dulaglutide, insulin degludec, and insulin glargine. In terms of its effects on postprandial and fasting blood glucose levels as well as the likelihood that individuals using it would have a decrease in HbA1c, [8-10] tirzepatide considerably outperformed dulaglutide, semaglutide, degludec, and glargine. Tirzepatide was the first medication of its sort to be researched since, according to studies, its advantages outweighed its disadvantages. However, considering its novelty, more research is necessary to fully comprehend any potential negative effects. [10] In this review, we will go into great detail about tirzepatide and show you how great it is for treating diabetes as well as other diseases including obesity, liver illness, and cardiovascular safety. We also contrasted it with other anti-diabetic drugs that have been demonstrated to be secure and effective. The literature that is now accessible on tirzepatide seems to be a bright spot for patients with diabetes, highlighting the urgent need for more extensive, long-term research.

Mechanism of action

The Role of Incretins in the Pathophysiology of Type 2 Diabetes Mellitus

With a higher affinity for GIP receptors, tirzepatide is a dual-acting agonist that acts on both GIP and GLP-1 receptors. It is a highly successful treatment for type 2 diabetes mellitus (T2DM), helping patients lose weight while also maintaining a stable glycemic state. When compared to parenteral therapy, [11] Elrick et al. were the first to show noticeably greater plasma insulin concentrations after oral glucose loading. It has been demonstrated that up to 65% of postprandial insulin release is explained by this phenomenon [12], known as the "incretin effect." GLP-1 and GIP are examples of incretin hormones. [13] GLP-1 and GIP plasma concentrations are relatively low during fasting and increase 15–30 minutes after a meal. [5] Once generated, GIP and GLP-1 trigger the insulinotropic response that is glucose-dependent and proportional to aid in the elimination of the absorbed load of fat and carbohydrates by stimulating the receptors on pancreatic cells. [4] Since the hormones are active for only a minute or two after release and are then destroyed by the enzyme dipeptidyl peptidase-4 (DPP-4) [4], incretin effects are comparatively transient. When compared to people without diabetes, [13] the effects of incretin are significantly reduced in those with type 2 diabetes. decreased insulinotropic effect on pancreatic

beta cells[14] and hyposecretion, or the generation of incretin hormones in response to meals. Are two theories that have been proposed to explain why the incretin effect is lessened in people with type 2 diabetes.[15]

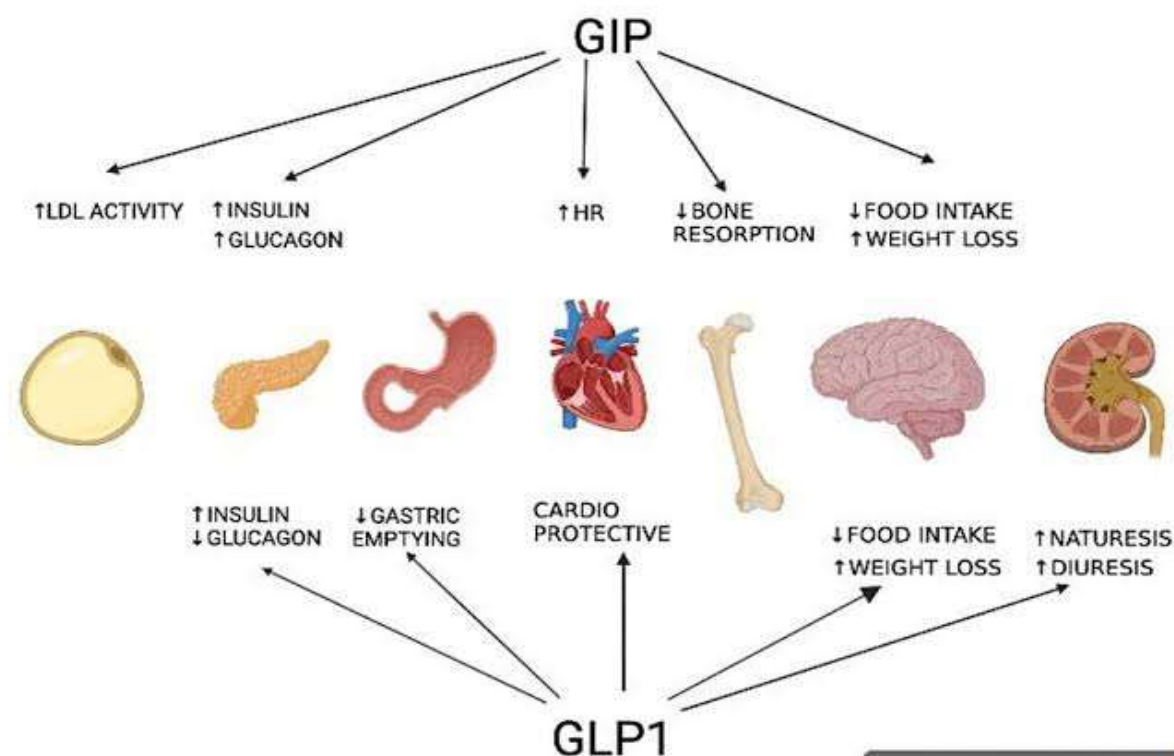
MECHANISM ACTION OF TIRZEPATIDE

Tirzepatide is a novel investigational medication developed for the treatment of type 2 diabetes. Its mechanism of action involves two key aspects:[16]

Glucagon-Like Peptide-1 (GLP-1) Receptor Agonism: Tirzepatide is a dual glucose-dependent agonist of the GLP-1 receptor.[18] It binds to and activates this receptor in a glucose-dependent manner. [22]When blood glucose levels are high, it stimulates the release of insulin and reduces glucagon secretion, helping to lower blood sugar levels.[26]

Glucose-Dependent Insulinotropic Polypeptide (GIP) Receptor Agonism: Tirzepatide also acts as a GIP receptor agonist. [30]Like with GLP-1, it stimulates the GIP receptor in a glucose-dependent manner. This results in increased insulin release in response to elevated blood glucose levels.[34]

By activating both GLP-1 and GIP receptors, tirzepatide provides a dual hormonal approach to regulate blood sugar levels. [37] This combination is intended to enhance glycemic control and may also lead to weight loss, making it a promising treatment option for people with type 2 diabetes.[39]



FACTOR AFFECTING :-

Tirzepatide's effectiveness and safety as a type 2 diabetes medication can be impacted by a number of factors. These elements consist of:

1) Patient Characteristics: Tyrzepatide's effect on blood sugar regulation can be influenced by an individual's age, weight, body composition, genetics, and general health.

2) Dose: Tirzepatide's efficacy and any adverse effects can be greatly influenced by the dosage that a medical professional prescribes. The right dosage may differ depending on the individual.

3) Diet and Lifestyle: A patient's eating patterns, degree of exercise, and general well-being can all have an impact on how successfully tirzepatide lowers blood sugar levels.

4) Concomitant drugs: Tirzepatide's effectiveness may be impacted by interactions with other drugs a person is taking, particularly those used to treat diabetes or other associated disorders.

5) Adherence: In order to get the intended effects, patients must adhere to the recommended treatment plan, which includes taking tirzepatide as prescribed and abiding by food and lifestyle guidelines.

6) Disease Progression: Tirzepatide's efficacy may be impacted by the degree and stage of a patient's diabetes. It might function differently in people with diabetes who have it under control as opposed to those who have it poorly or more advanced.

7) Side Effects: An individual's willingness and capacity to continue tirzepatide treatment may be impacted by the existence and intensity of side effects.

8) Monitoring: To make sure tirzepatide is successfully treating diabetes without having a negative impact, regular monitoring of blood sugar levels and general health is necessary.

9) Individual Response: Due to distinct physiological circumstances or genetic variances, individuals may react to tirzepatide differently.[40]

PHARMACOLOGY OF TIRZEPATIDE:-

1) Dual Receptor Activation: Tirzepatide is a dual glucose-dependent agonist of both the glucagon-like peptide-1 (GLP-1) receptor and the glucose-dependent insulinotropic polypeptide (GIP) receptor. When blood glucose levels are elevated, it activates these receptors in a glucose-dependent manner. This leads to increased insulin secretion and decreased glucagon secretion, helping to lower blood sugar levels.

2) Glucose-Dependent Mechanism: One of the unique aspects of tirzepatide is its glucose-dependent action. It primarily works when blood sugar levels are elevated. This minimizes the risk of hypoglycemia (low blood sugar) because tirzepatide's effects are triggered by high glucose levels.

3) Incretin Mimetic: Tirzepatide, by stimulating the GLP-1 receptor, mimics the action of endogenous GLP-1, a hormone that regulates insulin release and helps control blood sugar levels. This incretin effect supports glucose regulation.

4) GIP Agonism: The activation of the GIP receptor by tirzepatide enhances insulin release in response to elevated blood glucose levels, contributing to better blood sugar control.

5) Weight Management: Tirzepatide has been associated with weight loss in many patients. This is thought to be due to its impact on appetite regulation and the central nervous system, which leads to reduced food intake.

6) Gastrointestinal Effects: Like other GLP-1 receptor agonists, tirzepatide may have gastrointestinal side effects, such as nausea and vomiting, particularly when treatment is initiated.

7) Long-Acting Formulation: Tirzepatide is available in a long-acting formulation, which means that it can provide blood sugar control for an extended period, typically once a week. This reduces the frequency of injections compared to some other diabetes medications.

Tirzepatide's pharmacological actions make it a promising option for managing blood sugar levels and potentially achieving weight loss in individuals with type 2 diabetes. However, its use and effectiveness should be closely monitored by healthcare providers to ensure it is appropriate for each individual patient.[41]

A) PHARMACOKINETIC OF TIRZEPATIDE:-

1) Absorption: Tirzepatide, like many other subcutaneously administered medications, is likely to be absorbed into the bloodstream from the injection site. The rate and extent of absorption can vary based on factors such as the injection site, formulation, and other individual-specific factors.

2) Distribution: Once in the bloodstream, tirzepatide may distribute throughout the body. It might have a specific affinity for its target receptors (GLP-1 and GIP receptors) and other tissues, which can affect its distribution profile.

3) Metabolism: The metabolism of tirzepatide, if any, may occur in the liver or other tissues. The metabolism process can convert the drug into different forms, which may be inactive or active metabolites.

4) Excretion: The body eventually eliminates tirzepatide, and this process can involve the kidneys for renal excretion or the liver for biliary excretion.[42]

B) PHARMACODYNAMIC OF TIRZEPATIDE:-

Tirzepatide was being studied primarily for its potential use in the treatment of type 2 diabetes and obesity. The pharmacodynamics of Tirzepatide involves its ability to activate GIP and GLP-1 receptors in the body. When activated, these receptors can lead to several effects, including:

- 1) Increased insulin secretion from the pancreas in a glucose-dependent manner, which helps lower blood sugar levels.
- 2) Slowed gastric emptying, which can reduce post-meal glucose excursions.
- 3) Increased feelings of fullness and reduced appetite, potentially aiding in weight loss.[43,44]

PHARMACOVIGILANCE OF TIRZEPATIDE:-

1) Adverse Event Reporting: Healthcare professionals and patients are encouraged to report any adverse events or side effects associated with Tirzepatide to regulatory authorities and the drug manufacturer. This reporting helps to identify and assess potential safety concerns.

2) Clinical Trials: During clinical trials, researchers closely monitor participants for any adverse events. These events are systematically recorded and analyzed to determine their frequency, severity, and potential causality with the drug.

3) Post-Marketing Surveillance: After a drug is approved and available on the market, pharmacovigilance continues. Regulatory agencies, manufacturers, and healthcare professionals continuously monitor the real-world use of the drug to identify any unexpected or rare adverse events.

4) Risk Assessment: The collected data is used to assess the risk-benefit profile of the drug. If new safety concerns arise, regulatory agencies may take actions such as issuing warnings, contraindications, or even withdrawal from the market.

5) Signal Detection: Pharmacovigilance experts use statistical and analytical methods to detect patterns and signals that may suggest previously unknown safety issues.

6) Labeling Updates: Safety information is regularly updated on drug labels to inform healthcare providers and patients about potential risks and how to manage them.

7) Risk Minimization Strategies: In some cases, additional measures may be implemented to minimize risks, such as Risk Evaluation and Mitigation Strategies (REMS) in the United States.

ADVERSE DRUG REACTION:-

Adverse drug reactions are side effects or unexpected harmful reactions that can occur when taking a medication. The safety and side effect profile of any medication, including Tirzepatide, is typically assessed during clinical trials and post-market surveillance. For the most current and accurate information on the adverse drug reactions associated with Tirzepatide, I recommend consulting the drug's official prescribing information, healthcare professionals, or regulatory agencies in your region. They will have access to the latest data and can provide guidance on the potential side effects and how to manage them.

SIDE EFFECT OF TIRZEPATIDE:-

Common side effects may include

- a) nausea,*
- b) diarrhea*
- c) vomiting, and*
- d) injection site reactions.*

ACKNOWLEDGEMENT :-

Acknowledgment of Tirzepatide typically involves recognizing the medication, understanding its purpose (for treating type 2 diabetes), and being aware of its potential uses, benefits, and side effects. It's important to acknowledge this information if you are prescribed or considering using Tirzepatide as part of your diabetes management. Always consult with a healthcare professional for a thorough understanding and guidance on its usage.

CONCLUSION OF TIRZEPATIDE:-

Tirzepatide is a medication used for the treatment of type 2 diabetes. It can help lower blood sugar levels and may offer potential benefits to individuals with this condition. However, it's essential to use Tirzepatide as prescribed by a healthcare professional and be aware of potential side effects. The decision to use Tirzepatide should be made in consultation with a healthcare provider who can provide personalized guidance based on an individual's specific medical needs and circumstances.

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