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R E V I E W A R T I C L E

Efficacy, Safety, Moa, Adverse Effects of Bromocryptine for the Treatment of Major Disorders: A Systematic Review of the Drug

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A B S T R A C T

Currently, type 2 diabetes mellitus is managed and treated with the use of the drug bromocriptine. It belongs to the dopamine D2 agonist drug class and is a derivative of the ergot alkaloid. This activity will go through the benefits, risks, and mechanism of action of the drug bromocriptine, which is most commonly used to treat Parkinson's disease, acromegaly, pituitary prolactinomas, and other conditions. Additionally, we will emphasise the mechanism of action, adverse event profile, and other critical elements important to all inter-professional healthcare teams in managing patients with Type 2 diabetes mellitus, Parkinson disease, acromegaly, and pituitary prolactinomas using bromocriptine throughout this activity.

Keywords: type 2 diabetes, bromocriptine, Parkinson's disease

A R T I C L E I N F O

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C O N T E N T S

1. Objectives

Identifying bromocriptine's mode of action is one of the objectives. List any possible side effects of bromocriptine.

- Go over the proper monitoring for patients getting bromocriptine medication.
- Outline interprofessional team methods for enhancing communication and care coordination in order to promote bromocriptine and enhance results.

Indications

Currently, Type 2 diabetes mellitus is managed and treated with the use of the drug bromocriptine. It belongs to the dopamine D2 agonist drug class and is a derivative of the ergot alkaloid. This article examines the benefits, risks, and mechanism of action of bromocriptine, a drug that is commonly used to treat Parkinson's disease, acromegaly, and pituitary prolactinomas in addition to type 2 diabetes mellitus.

Diabetes Mellitus Type 2

The most recent FDA-approved use of bromo criptinemesylate is as an additional medicine to help with glycemic control in individuals with type 2 diabetes mellitus (type 2 DM).[1] Insulin resistance, pancreatic beta-islet dysfunction, and various other metabolic abnormalities are the hallmarks of type 2 diabetes mellitus (Type 2 DM), a chronic metabolic illness with a complex origin.[2] Because of this intricacy, it is frequently necessary to combine drugs to treat all of the many components of the disease, making the adjunct use of bromocriptine an alluring therapy.

2. Hyper prolactinemia

An FDA-approved drug called bromocriptine is used to treat hyperprolactinemia-causing conditions, which are typically brought on by prolactinoma, the most prevalent of the pituitary adenomas.[3][4] Both men and women can develop prolactinomas, which frequently cause headaches, infertility, gonadal abnormalities, and sexual dysfunction. [5] Surgery was the basis of prolactinoma treatment prior to the discovery of dopamine agonists.[5] The most common kind of treatment is medicinal therapy, thanks to the invention of numerous dopamine agonists, the first of which being bromocriptine. Surgery is only utilized in extreme cases if medicinal therapy has failed to control prolactin output or the adenoma has led to neurological impairments or visual abnormalities.[5]

Acromegaly

Acromegaly is characterized by a group of issues brought on by elevated levels of growth hormone (GH) in the blood. The sympathetic nervous system has an impact on GH levels; catecholamines that bind to alpha receptors raise GH levels in the blood while those that connect to beta receptors lower them. Catecholamines, such as norepinephrine, epinephrine, and L-DOPA, would raise GH levels in the blood of a typical adult.[6] Contrary to expectations, this sympathetic stimulation reduces GH in acromegaly patients, however its effectiveness for the majority of patients is still debatable.[6][7] Bromocriptine is a dopamine agonist that has been given FDA approval for the treatment of acromegaly.

3. Parkinson Disease

Parkinson disease (PD), a degenerative neurological condition caused by the death of dopaminergic neurons in the substantianigra, is characterized by rigidity, akinesia or bradykinesia, and postural instability. Levodopa is a successful medication for Parkinson's disease (PD), but prolonged use might lead to motor problems and a loss in effectiveness.[9][10] Co-administration with dopamine agonists like bromocriptine has historically been an effective treatment choice in these patient groups where levodopa is no longer as effective.[9] Bromocriptine is additionally utilized as an early PD treatment to postpone the start of levodopa use, thereby postponing the likelihood of dyskinesia and motor fluctuations that result from chronic use. PD treatment is currently inconsistent, however newer non-ergot dopamine agonists that have equivalent potency to ergot have emerged.

3. Mechanism of Action

Bromocriptine is a dopamine receptor agonist with selective agonist activity on D2 dopamine receptors while simultaneously acting as a partial antagonist for D1 dopamine receptors.[12] Dopamine agonism has variable effects depending on the target tissue. In Parkinson disease, bromocriptine binds directly to striatal dopamine D2 receptors, stimulating locomotion and attenuating the bradykinetic symptoms caused by the degeneration of dopaminergic nigrostriatal neurons.[13][9] This same D2 agonistic effect on the D2 receptors of anterior pituitary lactotrophic cells blocks prolactin exocytosis and gene expression, reducing the harmful effects of hyperprolactinemia in the case of a pituitary prolactinoma. In acromegaly, bromocriptine's dopaminergic effect can cause paradoxical blocking of GH release through tuberoinfundibular pathways, decreasing circulating blood concentrations of GH.[14][6] In type 2 DM, bromocriptine alters monoamine neurotransmitter concentrations in the suprachiasmatic and ventromedial nuclei of the hypothalamus, causing a sympatholytic effect that decreases metabolic processes, which can lead to glucose intolerance and insulin resistance.[2]

Administration

There are two different dosages of bromocriptine: one oral tablet/capsule (0.8 mg) is used to treat type 2 diabetes mellitus, and the other oral tablet/capsule (2.5 to 5.0 mg) is used to treat hyperprolactinemia, acromegaly, and Parkinson's disease.[15][16] The 0.8 mg formulation is designed to have a quicker release, reaching peak blood concentrations after about 45 to 60 minutes, with a bioavailability of 65 to 95%, as opposed to the 2.5 to 5 mg formulation's standard release, which reaches peak blood concentrations after about 3 hours with a bioavailability of 28%.[16] However, the following dosages are advised; treatment for any of these conditions must be customized depending on the patient's particular characteristics:

- Hyperprolactinemia: 1.25 to 2.50 mg/day as a starting dose, then an increase over the next few days, and a final maintenance dose of roughly 5 mg/day.
- With a maintenance dose ranging from 7.50 to 30.0 mg/day, acromegaly is treated with an initial dose of 1.25 to 2.50 mg/day and an increase in 2.50 mg increments until optimal GH blood concentrations are obtained.[7][6]
- Parkinson's disease: 2.50 mg/day as a starting dose, followed by 2.50 mg increases based on tolerance and effectiveness. Use the lowest effective dose to control symptoms; a low dose is defined as less than 30.0 mg/day, and a high dose is defined as 31.0 to 100 mg/day.[16][9][12]
- Type 2 Diabetes Mellitus: 0.8 mg/day at first, then 0.8 mg/weekly until the optimal glycemic control is achieved.

Adverse Effects

Most frequent adverse effects [15]

- Nausea
- Vomiting

- Dizziness
- Hypotension
- Headache
- Fatigue
- Additional Negative Effects [15]
- Cardiovascular issues (valvular injury, stroke, myocardial infarction)
- Psychosis
- Fibrosis (retroperitoneal, pleural, cardiac valve).

Contraindications

Treatment with bromocriptine is not recommended for people who have type I diabetes, syncope, or psychosis. Bromocriptine should be avoided by people who suffer from syncopal migraines because it can cause hypotensive episodes and by people who are breast-feeding because it inhibits lactation. Additionally, because CYP450 3A4 is involved in the metabolism of bromocriptine, it should not be administered concurrently with inducers or inhibitors of CYP3A4 or in patients who have hepatic impairment [16].

Monitoring

Bromocriptine users should perform a pregnancy test if amenorrhea develops due to the potential of pregnancy and the fetus's decreased prolactin output with ongoing treatment. If pregnancy is found, doctors should stop prescribing bromocriptine unless specifically instructed differently by a doctor. Before taking bromocriptine, patients should have a cardiovascular evaluation, as well as liver function tests (LFTs) to look for raised liver enzymes [16].

Toxicity

Anyone with hepatic impairment should avoid taking bromocriptine because its metabolism is predominantly carried out in the liver by the cytochrome P450 3A4 enzymes.[16] Accidental overdose cases have mostly been observed in youngsters, where they can have a variety of dopaminergic consequences, most notably hypotension. Utilizing activated charcoal to stop systemic absorption, magnesium citrate administered via nasogastric tube, and intravenous saline to raise blood pressure are all part of the overdose treatment.

4. Improving Healthcare Team Results

In addition to a skilled patient-centered approach from doctors, the diagnosis and treatment of complex disorders like type-2 diabetes mellitus, acromegaly, hyperprolactinemia, and Parkinson disease necessitate an interprofessional team of healthcare professionals who can assist patients from their first clinic visit until they have achieved symptomatic control. Collaboration between clinicians, nurses, chemists, laboratory technologists, medical students, and all other involved members of the healthcare team improves patient safety, increases coordination of services, and results in better outcomes for chronic diseases. [Level 3] Failures in interprofessional communication can result in patient treatment errors and miscommunication that could be fatal or result in unneeded morbidity and mortality. When a patient initially visits a clinic, the primary care physician and the relevant specialist must work together to make the initial diagnosis. The combination of clinical findings and laboratory tests determines the reliability of the clinician's diagnosis. The physician must consult with the chemist to determine the proper medicine dosage and administration, and the chemist must speak with the patient to ensure that the patient is aware of all directions and any side effects. In the event that a patient takes the drug incorrectly, they should go to the emergency room, where nurses will be in charge of close supervision and will consult with toxicologists, radiologists, or even paediatric specialists in the event that a patient accidentally overdoses on medication as a child. Medical students must also efficiently interact with each other if they are participating.

Health management continues even when people take their medication as directed on a regular basis. Certified Diabetes Educators (CDEs) will offer food and nutritional advice to patients with type 2 diabetes mellitus, and they will work with mental health specialists, podiatrists, optometrists, and other community health workers to address the disease's numerous aftereffects. Parkinson disease, acromegaly, and hyperprolactinemia patients must continue to get care from their respective neurological and endocrine teams in order to holistically address their conditions. In order to guarantee safe and effective therapy, communication between all team members is essential. Even one unneeded adverse event is one too many, and bromocriptine has historically had a low incidence of serious adverse effects.

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