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A REVIEW ON INTRANASAL DRUG DELIVERY SYSTEM FOR ANTI-ASTHAMATIC DRUG

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ABSTRACT

Asthma is the most common respiratory disease. Despite significant advances in diagnosis and treatment of the disease, most Canadians with asthma still do not manage their condition well. It is easy to self-regulate and supports body and mucosal protection. Liquid and dry powder forms are available for intranasal administration to achieve maximum bioavailability. Because the medication enters the bloodstream immediately through the nose, it is non-invasive and is often used topically for therapeutic purposes. Small molecules are more easily absorbed by the nasal cavity than larger molecules, and this can be improved by using absorbent products. Drugs absorbed from the IN enter directly into the systemic circulation, bypassing the enterohepatic circulation. Clinical studies have shown that the absorption and bioavailability of the drug when taken orally is comparable to intravenous (IV) administration, with the highest plasma concentration occurring 10 minutes after ingestion, postpartum. Physical and chemical properties of the drug, the function of the nasal mucociliary system and the presence of elements that facilitate nasal absorption. Individualized and gradual asthma treatment is necessary, especially for severe asthma. Strategies based on understanding the disease rather than a "one-size-fits-all solution" for patients are based on the concept of shared decision-making between patients and physicians in determining treatment goals and actual use. Pharmacological treatment such as anti-inflammatory drugs, consideration of the "curable properties" of asthma, and phenotypic and endotype analysis of severe asthma.

KEYWORDS: Asthama, First pass metabolism**,** Intranasel**,** self-administration**,** bioavailability**,** mucociliary

Introduction

The evolution of nasal drug delivery can be traced back to the early days of topical creams to achieve local effects. Nasal healing, also known as "Nasya karma", is a well-known medical practice in Indian Ayurvedic medicine. This method involves permeable endothelial cells and vascularized epithelium and is simple, easy, and effective. It absorbs the medicine quickly and prevents bacteria from entering the liver. Intranasal administration also allows for lower doses, faster treatment of high blood pressure, and the first use of medications with fewer side effects. The hypometabolic area of the nose can pursue the advantages of neurotherapy by overcoming the disadvantages of the oral route. Additionally, nasal administration offers advantages such as anonymity, self-medication, patient comfort, and the ability to treat patients with light-filled syringes. It also reduces the time delay associated with oral drug administration. [1] This is a good way to deliver drugs such as proteins and peptides in low doses and with low oral bioavailability. Another factor that causes less protein and peptide to be absorbed from the nose is the rapid removal of drugs from the absorption site in the nose by mucociliary clearance mechanisms. Intranasal administration is non-invasive, painless, does not require sterilization and can be administered quickly and easily by consumers or doctors, especially in emergency situations. Additionally, nasal oils may provide better results than non-medicated ones. Animals are used to test many drug candidates, including small amounts of iron and protein. Research shows that administering some hormones and steroids through the nose provides better absorption. [2]

Selection Criteria for Nasal Drugs:

According to a detailed study of the literature on the the nasal pathway of medication delivery, a good candidate for a nasal medicine should have the following qualities: 1) Suitable water solubility is needed to deliver the required dose in a 25–150 ml formulation size given via the nostril. 2)No smell or aroma linked with the medicine that is disagreeable. 3)Optimum nasal absorption characteristics. 4)The drug did not cause irritation to the nose. 5)A good therapeutic justification for nasal dose forms, such as a quick onset of action. 6) Small doses. Usually less than 25 mg per dose. 7) No nose problems occur due to the product. 8) Proper job stability. [3]

Mechanism of Absorption:

The paracellular system, also known as the transport system, is located in the central system. This is a simple and unnecessary idea. Chemicals with an atomic weight above 1000 daltons have been shown to be not bioavailable. The second part of the lipid pathway-based exchange is transcellular measurement, which is responsible for the delivery of lipophilic drugs, the amount of which depends on the lipophilicity of their molecules. Additionally, drugs are transported through the cell wall using active carriers, transporters, or narrow openings. For example, the unique biopolymer chitosan facilitates drug delivery by widening narrow junctions in epithelial cells. [4]

Advantages

Advantages

1) It can be transported directly to the central nervous system and circulate throughout the body.

2) The bioavailability of large therapeutic molecules can be increased by using absorption products.

3) Nasal administration is good for the following drugs: Not suitable for oral administration. It is a recommended method for patients receiving long-term treatment.

4) Other methods for parenteral administration, especially proteins and peptides.

5) Rapid absorption of the drug from the mucosal membrane with adequate blood supply.

6) The needle is sucked into the falling area of the nose.

7) Prevent drug degradation in the gastrointestinal tract.

8) Easier and more satisfying.

9) Self-control is possible.

10) Increase bioavailability.

11) Easy management.

12) Quick start.

13) Various side effects. [5, 6]

Disadvantages

1) Medicines and ingredients in dosage form may cause local side effects and damage the nose.

2) Some surfactants used as disinfectants can damage or even dissolve films when the concentration is high.

3) Due to mismanagement, some papers may enter the lungs and other respiratory diseases.

4) The suction power of the nose is smaller than the stomach.

5) There may be a feeling of discomfort depending on oral administration. [7]

Asthama

Asthma is characterized by overreactivity of tracheobronchial muscles to various stimuli, narrowing of the airways and often mucus congestion, mucosal edema and increased secretion. [8]

Casuses –

Respiratory disease

Strenuous exercise

Allergy

Environmental pollution

Family history

Depression

Obesity

Smoking

Clinical evaluation

Most people with asthma do not have serious asthma symptoms. The first symptoms of the disease appear suddenly or gradually, usually at night or in the early morning hours. Severe symptoms include chest pain, cough, wheezing or wheezing sounds during exhalation, and shortness of breath. Symptoms of hyperinflation of the lungs in patients with asthma include chest tightness and decreased diaphragm movement. Asthma can range from mild to severe, depending on the airways affected. Assessment of lung function can determine the degree of airflow limitation. Spirometry is the most commonly used breath test and determines how quickly the lungs change during breathing. Forced vital capacity (FVC) is the most important capacity. The person receiving treatment should exhale quickly and fully after taking a good breath. In general, healthy lungs can exhaust their capacity in six seconds or less. However, if airflow is restricted, exhalation time will increase up to five times. In fact, the ratio of FEV1 to FVC is calculated by measuring the switch within 1 second of expiration, comparing it with FVC, and then recording the results. In most healthy people, the first-second FVC excretion rate is at least 75%. [9]

Classification

I. Bronchodilators

A. β, Sympathomimetics: Salbutamol, Terbutaline, Bambuterol, Salmeterol, Formoterol, Ephedrine.

B. Methylxanthines: Theophylline (anhydrous), Aminophylline, Choline theophyllinate, Hydroxyethyl theophylline, Theophylline ethanolate of piperazine, Doxophylline.

C. Anticholinergics:

Ipratropium bromide,Tiotropium bromide.

II. Leukotriene antagonists

Montelukast, Zafirlukast.

III. Mast cell stabilizers

Sodium cromoglycate, Ketotifen.

IV. Corticosteroids

A. Systemic: Hydrocortisone, Prednisolone and others.

B. Inhalational: Beclomethasone dipropionate, Budesonide, Fluticasone propionate, Fluniso-lide, Ciclesonide.

V. Anti-IgE antibody

Omalizumab

Figure No. 1 [10]

MECHANISM OF ASTHAMA

Mechanisum of Anti-Asthamatic drug

Antiasthamatic	Mechanism in asthma relief
Anticholinergics	It blocks cholinergic receptors, thus preventing cholinergic drugs from binding to cause contraction and increased secretion.
antileukotriene	Modify or inhibit the activity of leukotriens, which decreases arachidonic acid induced inflammation and allergen-induced bronchoconstriction.
Beta agonist and xanthine derivatives	Rise intracellular levels of cyclic adenosine monophosphate (cAMP) which in turn produce smooth muscle relaxant and dilated the constricted bronchi and bronchioles.
Corticosteroids	Prevent the inflammation commonly provoked by the substance released from mast cells.
Mast cell stabilizers	Stabilize the cell membranes in which the antigen -antibody reactions take place in (the mast cell), thereby preventing the release of substance such as histamine that cause constriction

TABLE NO .1

ADVERSE EFFECTS

Side effect

1) Bronchodilators

A] β2 Sympathomimetic:

Tremor, insomnia, nausea, bronchospasm, vomiting seizures.

2) Methyl xanthine

Insomnia, nervousness, seizures.diarrhea.

3) leukotriene antagonist

Abdominal pain, dizziness, fever, asthma, toothache.

4) Mast cell stabilizers Chromolyn and zileuton

Palpitation , chest pain, fatigue, migraine, Cough, flushing,

5) Corticosteroids

Nasopharyngitis, bronchitis, back pain, tootache.

6) Anti igE and antibody

Headache, pain, fatigue, dizziness. [11]

ETHNIC DIFFERENCES IN CHILDREN DIAGNOSED WITH ASTHMA

Figure no.2

ETHNIC DIFFERENCES IN CHILDREN DIAGNOSED WITH ASTHMA

Different factors affecting nasal drug absorption

1 Biological Factors

• Structural features

• Biochemical changes

II Physiological factors

• Blood supply and neuronal regulation

• Nasal secretions

• Mucociliary clearance and ciliary beat frequency

III Physicochemical Properties of Drugs

•Molecular weight

•sIze

•Lipophilicity

Strategies to improve nasal absorption

Nasal infections have many complications that interfere with the absorption of some medications.

There are many technologies used to develop nasal sprays.

Nasal enzymes inhibitors:

Various enzyme inhibitors are used to reduce drug metabolism in the nose. Inhibitors include proteases and peptidases that act as inhibitors of the formation of peptide and protein molecules.

Structural modification:

To improve nasal absorption, medication structure can be changed without affecting pharmacological action.

Permeation enhancer:

Many types of permeability enhancers, such as phospholipids, cyclodextrins, bile salts, surfactants, and fatty acids, have been studied to increase nasal absorption .[12]

CONCLUSION

Intranasal drug delivery systems have been shown to be a non-invasive and effective treatment for asthma. It has advantages such as rapid onset of action, low impact on the body, and good follow-up of the patient. However, actual results may vary depending on the type of drug, patient characteristics and method of use. More research and clinical trials are needed to determine the long-term effectiveness and safety of intranasal medications in the treatment of asthma. Patients should consult their physician to determine whether this technology is suitable for their specific needs.

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