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Characterization of injectable formulations and optimization of their delivery by enteral tube: A physicochemical and physiological approach.

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BACKGROUND AND IMPORTANCE

Oral administration of injectables is an alternative for patients with difficulties tolerating solid pharmaceutical forms.

Due to their physicochemical characteristics not adapted to oral administration, gastrointestinal adverse effects can appear, especially in patients with transpyloric probes, especially when they present an osmolarity >500 mOsm/L or pH <3.5.

AIM AND OBJECTIVE

The aim of the present work is to characterize the physicochemical properties of injectable formulations commonly used orally and their site of gastrointestinal absorption to increase safety in their administration by transpyloric tube.

MATERIALS AND METHODS

A literature search was conducted to establish the gastrointestinal absorption site of the active principles (AP) analyzed.

For each preparation, pH and osmolality were experimentally determined. The pH was measured with a pH meter (Crison 2006, Hach Lange España, S.L.U., Spain). Osmolarity was determined using the Fiske Model 210 Micro Osmometer (John Morris Scientific Pty Ltd., Australia), considering the density of the active principles studied to be equal to 1 mg/ml. All measurements were performed in triplicate.

RESULTS

Formulas tested with good bioavailability

Transduodenal and transjejunal
Transduodenal only
No information
Not recommended
*Recommended to increase the dose

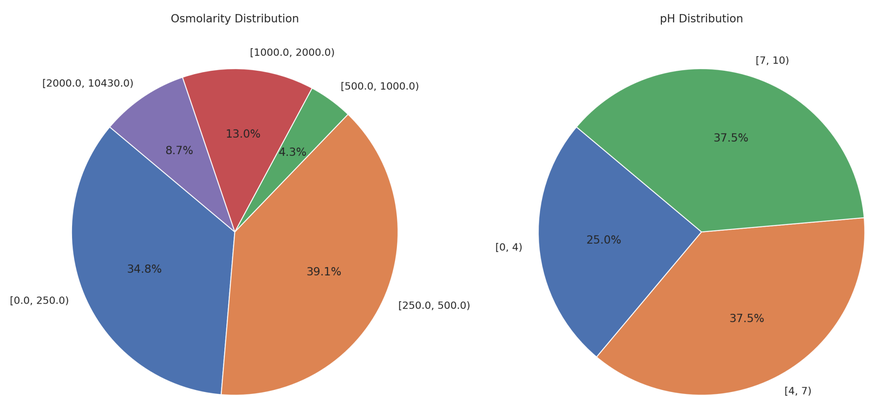
- Atropine 1 mg/ml
- Bicarbonate 1 mg/ml
- Calcium Folinate
- Dexamethasone 4 mg/ml
- Dexamethasone 40 mg/5ml
- Diazepam 10 mg/2ml
- Digoxin 0.25 mg/ml
- Furosemide 20 mg/2ml
- Hydrocortisone base 75 mg
- Labetalol 5 mg/ml
- Flecainide acetate 10 mg/ml
- Levomepromazine 25 mg/ml
- Metamizole 0.4g/ml
- Metoclopramide
- Midazolam 15 mg/ml
- Ondansetron 4mg/ml
- Piracetam 200 mg/ml
- Propranolol 1mg/ml
- Sodium Chloride 20%
- Theophylline 20 mg/ml
- Tranexamic Acid 500 mg/ 5ml
- Vancomycin 1g
- Verapamil 2.5 mg/ml
- Vitamin K 10 mg/ml

Table 1. Physicochemical properties.

Formulation	Osmolarity (mOsm/L)
Metamizol 0,4g/ml	1861.67
Digoxina 0,25 mg/ml	10430.00
Bicarbonato 1 mg/ml	1520.00
Cloruro sódico 20%	7285.00
Piracetam	1596.33
Diazepam 10 mg/2ml	9028.33

Formulation	pH
Midazolam 15 mg/ml	3.01
Ondansetrton 4mg/ml	3.30
Vancomicina 1g	3.14
Atropina 1 mg/ml	3.06
Propranolol 1mg/ml	3.58

Figure 1. Physicochemical properties:



CONCLUSION AND RELEVANCE

In most of PA studied, the gastrointestinal absorption of the drug is not sufficiently characterized, leading to uncertainty when administered by transpyloric tube.

Many of the injectables have a high osmolarity and therefore require prior dilution, , while the pH values of some of them can be an added factor for the development of digestive intolerances.

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