Palatability assessment of oral medication

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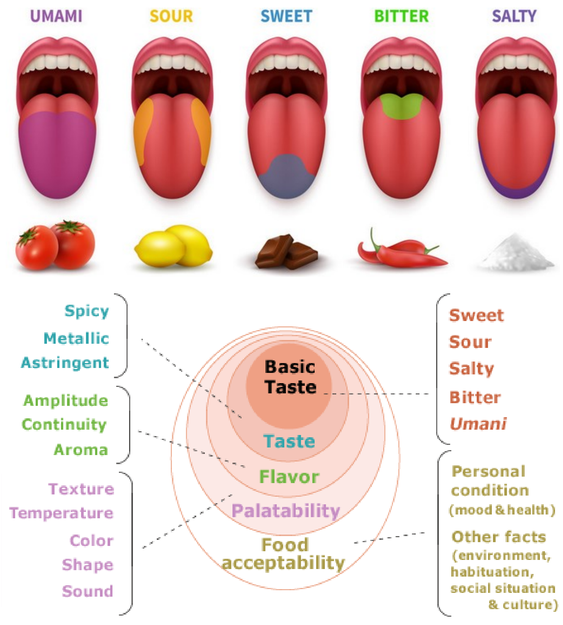
Introduction

Some drug forms are not adapted to children or elderly. Lists of crushable tablets or openable capsules are already published but don't consider palatability modifications. The palatability is a part of the acceptability, particularly in paediatric population. The modification of the palatability of a drug can decrease the drug compliance.

Physicians sometimes want to know the palatability of a drug. The answer can conduct to change the drug form, the molecule or to mask the taste with another substance (beverage, food).



Aim

The aim of this study is to determine the palatability of diluted oral solid medications and oral liquid forms.

Tested drugs — Extract of solid oral forms	Palatability score
AMOXICILLINE (CLAMOXYL) 1000 mg dispersible tablet	4.7
AMOXICILLINE/CLAVULANIC ACID 500/62.5 mg (AUGMENTIN) film-coated tablet	1.3
ATENOLOL (TENORMINE) 50 mg film-coated tablet	2.0
AZITHROMYCIN (ZITHROMAX) 250 mg film-coated tablet	1.7
BISOPROLOL (CARDENSIEL) 5 mg film-coated tablet	3.0
CANDESARTAN (ATACAND) 4 mg tablet	2.0
CANDESARTAN/HYDROCHLOROTHIAZIDE (HYTACAND) 16/12.5 mg tablet	2.0
CEFIXIME Mylan 200 mg film-coated tablet	2.0
CEFUROXIME (ZINNAT) 250 mg coated tablet	1.0
CLINDAMYCINE (DALACINE) 300 mg capsule	1.0
DOMPERIDONE (MOTILIUM) 10 mg film-coated tablet	3.0
DOXYCYCLINE (MONOCLINE) 100 mg tablet	2.0
ENALAPRIL EG 20 mg tablet	2.0
FLUDROCORTISONE (FLUCORTAC) 50 µg tablet	2.7
HYDROCORTISONE (HYDROCORTISONE) 10 mg tablet	1.3
HYDROCORTISONE 2 mg capsule	2.0
IRBESARTAN (APROVEL) 150 mg tablet	2.0
IRBESARTAN ARROW 150 mg tablet	2.0
LANSOPRAZOLE MYLAN 15 mg orodispersible tablet	4.3
LEVOFLOXACIN ACCORD 500 mg film-coated tablet	1.0
LEVOFLOXACIN ARROW 500 mg film-coated tablet	1.0
METOPIMAZINE (VOGALENE LYOC) 7.5 mg oral lyophilisate	4.7
METRONIDAZOLE (FLAGYL) 250 mg film-coated tablet	1.0
POLYSTYRENE SULFONATES (KAYEXALATE) 15 g powder for oral suspension	3.7
PREDNISOLONE (SOLUPRED ORODISPERSIBLE) 20 mg orodispersible tablet	2.0
PREDNISOLONE (SOLUPRED ORODISPERSIBLE) 5 mg orodispersible tablet	2.0
PREDNISONE EG 20 mg tablet	1.7
PREDNISONE (CORTANCYL) 20 mg tablet	1.3
PROPRANOLOL TEVA 40 mg tablet	2.0
SEVELAMER (RENVELA) 2.4 g powder for oral suspension	4.3
SEVELAMER CARBONATE (RENVELA) 800 mg film-coated tablet	3.0
TRIMETHOPRIM/SULFAMETHOXAZOLE (BACTRIM) AD. 400/80 mg tablet	2.0
TRIMETHOPRIM/SULFAMETHOXAZOLE TEVA AD. 400/80 mg tablet	2.0

Tested drugs — Extract of liquid oral forms	Palatability score
ACEBUTOLOL (SECTRAL) 5000 mg 125 mL oral solution	2.7
ACETAMINOPHEN (DOLIPRANE PEDIATRIQUE) 2400 mg 100 mL oral suspension	4.0
AMOXICILLINE/CLAVULANIC ACID NOUR.(AUGMENTIN) 3000/375 mg 30 mL oral suspension	4.0
AZITHROMYCINE (ZITHROMAX) 1200 mg 30 mL oral suspension	2.7
BETAMETHASONE (CELESTENE) 15 mg 30 mL solution for oral drops	2.7
CAPTOPRIL (NOYADA) 100 mg 100 mL oral solution	2.7
CEFUROXIME (ZINNAT) 1000 mg 40 mL oral suspension	4.0
CLARITHROMYCINE (ZECLAR) 2500 mg 100 mL oral suspension	3.3
IBUPROFENE (NUROFEN PRO) 3000 mg 150 mL oral suspension	5.0
JOSAMYCINE (JOSACINE) 6000 mg 60 mL oral suspension	4.3
METRONIDAZOLE (FLAGYL) 3000 mg 120 mL oral suspension	4.3
NEFOPAM (ACUPAN) 20 mg 2 mL injectable solution	2.0
NEFOPAM MEDISOL 20 mg 2 mL injectable solution	2.0
THIAMINE (BEVITINE) 100 mg 2 mL injectable solution	1.0
TRIMETHOPRIM/SULFAMETHOXAZOLE (BACTRIM) 4000/800 mg 100 mL oral suspension	2.7

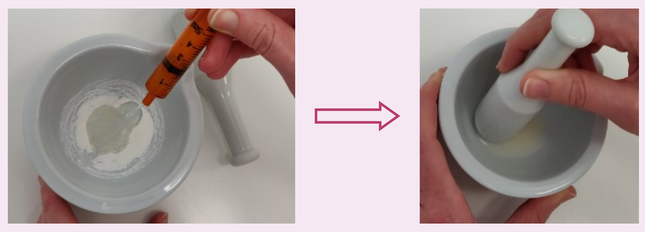
Material and methods

For oral solid forms:

The tablet is crushed or the capsule is opened to obtain a powder

Some water is added to the powder

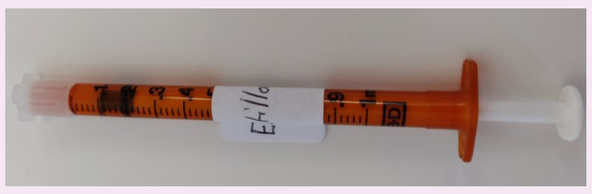
The mixture is homogenised



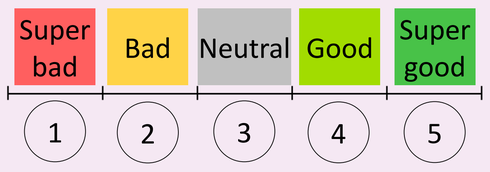
For oral solid forms and oral liquid forms:

0.1 mL of the drug is sampled with a syringe

The syringe is anonymised to be tested



The drug was tasted in water and in a flavoured suspending excipient by three pharmacists.



The palatability score (PS) was determined using the 5-point numeric rating scale of the European Medicines Agency.

The possibility of administration of a fraction of the dose was also determined.

Testing conditions:

* Testers: isolated from each other
* Tested drug: unknown to the testers
* Quantity tested: 0.1 mL (<1/10 of the therapeutic dose)
* Time between two medications: 5 minutes

Excluded drugs:

* Cytotoxic
* Modified release forms

Results

150 drugs tested
One time by 3 pharmacists

107 solid forms
Average PS: 2.3
PS < 3/5: 72 %
Bitter taste: 87 %

43 liquid forms
Average PS: 2.9
PS < 3/5: 60 %
Bitter taste: 14 %

Some medications cause other sensations:

* Tricyclic antidepressants are anaesthetic for mucosa
* Naftidrofuryl and febuxostat are irritant for the oesophagus
* Glycerine in the formulation causes a warm sensation in the mouth.

Liquid forms have a better palatability than solid forms ($p<0.001$). Crushed tablets or opened capsules have frequent bitter taste.

A flavoured suspending excipient can mask the taste of 80/107 solid medications but only when the bitterness was low.

Conclusion

This database provides part of the answer regarding the acceptability of a treatment. PS is an important factor for compliance, particularly in paediatric population.

A validated palatability score is required because taste varies with age, ethnic and many other parameters.

This study must be completed by other elements such as the pH of the solution, the stability of the active substance or some solubility parameters.