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Taste Masking Practices in Solid form Drugs

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Review Article

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ABSTRACT

Pleasing flavor is a crucial parameter for medicines to be taken orally and a key component to consider when formulating oral dispersions, oral dissolving, buccal tablets, and other formulations that encounter the taste buds. It has been found that good taste and texture can have a huge impact on product sales. Bad flavor is among major drug design problems mostly. Flair camouflage technology provides ample room for inventions and patents. Various methods, such as adding flavors and sweetening agents, using lipoproteins to suppress bitterness, numbness of taste buds, coating drugs with inert agents, microencapsulation, emulsions multiple and viscosity modifiers, vesicles and liposomes. Synthesis of prodrugs, salt formation, inclusion of compounds and molecular formation. This review briefly attempts to introduce different taste masking techniques in terms of dosage forms and new methods of assessing the effects of taste masking.

INTRODUCTION

Acceptable taste is a key parameter for medicines to be administered orally. Bad taste is among the most crucial set of problems faced by many drugs. Taking bitter drugs orally at acceptable levels is a major problem for healthcare providers. An effective way to reduce and remove the unacceptable taste is by improving the palatability of oral medications. Many oral medicines and many foods and drinks and fillers contain unpleasant bitter ingredients. The most common ways to achieve taste masking include a variety of physiochemical processes that prevent drug interactions with flavor sensors on tongue.

Various flavor masking techniques are being adopted to mitigate easy edibility issues. When using unpleasant-tasting drugs, even the slightest touch is enough to make you feel unpleasant. Traditional taste altering methodologies (like using only flavors, sweeteners and amino acids) usually not sufficient to mask the harsh flavor of some drugs (like etoricoxib, celecoxib, quinine) and antibiotics (such as levofloxacin). Taste of orally administered medicines like Ibuprofen cannot be masked with sweeteners for their resilient natural taste [1].

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The ideal process for taste masking, formulation and characterization requires the following properties:

- Include minimal equipment and processing steps.
- Fewer excipients are needed to get the best formulation
- Bioavailability of the drug should not be harmed.
- Seeking affordable raw materials.
- Reduce production costs.
- Can be manufactured at ambient temperature.
- Higher safety range of excipients.
- Prepare quickly and easily.

Taste masking methods

There are many methods that can be used to physically hide the unpleasant taste of the drug. Here are some for taste-masking with:

- Sweetener, amino acid and flavors
- Polymer coating
- Inclusion complexes
- Ion exchange resins
- Solid dispersion
- Microencapsulation
- Bulk Extrusion
- Multiple emulsions
- Liposomal development
- Concept of prodrug
- Spray drying technology.
- Adsorption
- Fatty compounds such as lipids and lecithin.

LITERATURE REVIEW

Masking taste with flavors, Natural or synthetics sweeteners also by using amino acids is the common and easiest way to mask flavors, especially for infant formulas, chewable tablets and liquid formulas. However, this method is not very effective for very bitter and water-soluble drugs. The materials used to hide taste are generally categorized according to compelling basic taste being masked. Natural products include essential oils such as fruit juices, peppermint, lemon oils, herbs and spices, and their distillates. The following table shows the list of such taste masking compounds (Table 1). They are provided in the form of concentrated extracts, alcohols, aqueous solutions or syrups.

Table 1. List of flavoring agents.

Flavor natural	Synthetic flavors	Basis of choosing a flavor
Juices – Raspberry	Alcohol based formulation	Match prevailing taste of the medicine
Extracts – Liquor ice	Water based solution	Known popularity of flavors
Spirits - Lemon and Orange	Powders	Age of patients
Aromatic Oils – Peppermint and Lemon.	-	Allergy

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Clove oil and calcium carbonate have been found to be particularly useful in masking unwanted active ingredients in formulation which must be chewed or dissolved in the mouth before being consumed in solution. Aspartum and sodium saccharin are sweeteners used to mask the bitterness of the drug. Sodium glycyrrhizinate has been used with flavors to mask the bitterness of guaifenesin (Table 2) [2].

Use of sweeteners

- Additional taste variations linked with sweetness.
- Cooling sensation on esophageal surface.

Table 2. List of sweeteners.

Natural sweetener	Artificial sweetener
Sucrose, glucose, fructose	Saccharin, Saccharin sodium
Sorbitol, mannitol, glycerol	Aspartame
Honey, liquor ice	Artificial Sweetener

One of important factors to consider when masking the taste of the coating can be chosen by the choice of coating polymers. The coating prevents interaction of the harsh tasting medicine by blocking the drug contact with the taste buds in mouth. An appropriate choice of masking substance completely masks the flavor of the sour tasting drug without altering the delivery mechanism of the drug. These masking substances offer a physical wall around the medicine. Few non-reactive masking substances such as starch are listed below; povidone, gelatin, methylcellulose, ethylcellulose, etc. are employed to coat the several pharmaceutical formulations.

Every non-toxic polymer that is unsolvable at neutral pH i.e., 7.0 ± 0.5 while solvable at pH above 8.0 could be a desirable choice for the task. Masking Ibuprofen's flavor was done effectively by a technique called "air suspension coating" to form microcapsules containing a pharmaceutical core of a crystalline coating of ibuprofen and a methacrylic acid copolymer which provides properties masked during chewing.

Fluidized bed processor is among highly efficient methods of masking drug taste. The method involves fluidizing fine powders up to 50 μm in expansion chambers through fast moving hot air and the drug particles gushed from the top of the expansion chamber with spray nozzle are then get covered with the coating solution on their way to the bottom. The coated granules are dried in hot air, afterwards.

This technique is the approach most simple and important to mask the taste, especially in formulations pediatric, tablets chewable and formulations liquid. However, the methodology under discussion is ineffective for drugs very harsh and very soluble in water. The sweeteners and artificial flavors are being used excessively in this techniqueto improve the taste masking effectiveness. Many drugs such as dentalcare and mouthwashes that are applied in the oral cavity, taste unpleasant. The unpleasant taste in some formulations as in mouthwashes and cough pills contain medicinal substances that taste bitter as the oil of eucalyptus and can be masked by fenchone mixing or by that of borneol. These masking agents drastically conceal the experience of organoleptic sensations caused by the unpleasant volatile oil.

The cooling effect of the masking agents imparting flavors also help to reduce the bitterness cooling of the agents masking of the flavor also help to reduce the bitterness. The sweetener 1,2':2,3'-Di- anhydride - Di-D -Fructofurano - also are suitable for pasta dental, rinses mouth and food. The menthol reduces the taste bitter and weak; the formulations of calories show effects beneficial inhibitors caries. Pastes dental not bitter are sweeteners of chloride of benzethonium stevia. Extract and sweetener made based glycerin. Shows one activity bactericidal of 100% against *E.coli*. The anethole and menthofuran in various pasta dental is used not only to mask the bitterness, but also to improve the stability of the formulation at low temperatures. Also it has established the use of certain flavors of imitation to mask the taste of the chloride of ammonium and other drugs saline. The various concentrates of flavor of imitation used are grape, maple, raspberry and cherry wild, etc. They have been compared with some of the syrups flavored officers and have been recognized as good agents maskers for medicines with salt.

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The taste bitter of the acetate of zinc dihydrate in the formulation of tablets is can mask using saccharin, complex of anethole-β-cyclodextrin and stearate of magnesium, followed by compression with polyethylene glycol compressible and fructose . The incorporation of agents such as phenate sodium in one aspirin anesthetizing - silk drug is used for sufficiently insensitive to papillae taste for 4 to 5 seconds, which make that the taste bitter of aspirin imperceptible. The combination of acid citric and bicarbonate of sodium flavors specific is used to mask the taste bitter of the maleate of chlorpheniramine and the hydrochloride of feilpropanolamina (flavor to orange and cream) of famotidine (flavor to lemon) and paracetamol (flavor cherry). The carbonates and bicarbonates of metals alkali in combination with flavor spearmint, flavor to anise and sweeteners are used to improve the flavor of the diclofenac. The glycyrrhiza and gum xanthan is used to enhance the flavor of the extract that contains Pogostemi Herba. It was used glycyrrhizinate monosodium in combination with flavors to mask the taste bitterness of the guaifenesin. Clove oil has proven to be a great taste - masking element for masking the taste bitter of several drugs, most notably analgesics, antitussives, expectorants, decongestants, or their combination, because its effects Anesthetic tasty and smooth. To assist in the capacity of masking of the taste of the nails are preferred the honey of vanilla or vanilla artificial. It may include carbonate calcium, acid citric or bicarbonate of sodium in the formulation if it requires formation of foam. The drugs that can be masked taste for this composition include acetaminophen, aspirin, ketoprofen.

It can use a composition which comprises anethole, eucalyptol (refreshing, vaporizer) and salicylate of methyl (which inhibits the bitter taste) to mask the taste unpleasant to the thymol and leave to the consumer with a pleasant sensation of taste . They are used citrate sodium dihydrate, saccharin sodium, sugar refined and scents to mask the taste bitter of the ibuprofen when it is formulated as a syrup with pyridoxine HCl. Liposomal associated flavors have been reported to mask the bitter taste of medications in aqueous suspensions.

The aspartame is used as a sweetener important to reduce the bitterness. A very low concentration (0.8%) is effective in reducing the bitterness of 25% of paracetamol. The starch, the lactose, and mannitol also part of the exhibited flavor masking properties of the caffeine. The sweeteners artificial as the neohesperidin dihydrochalcone and hesperidin dihydrochalcone 4 '- β-d glucoside can mask the bitterness and saltiness due to their sweetness lingering. A sweetness persistent masks the taste, mainly because the profile of taste a substance bitter appears more later than it usually lasts the sweetness normal the sugar. The low levels of monoammonium glycyrrhizinate is been reported to mask tastes bitter, harsh and astringent, chewable cough multivitamin-/syrup cold, oral antibiotics, analgesics chewable, and alcohol in based oral antiseptic. Is seeking actively various inhibitors insipid/sweet as inhibitors of the bitterness. The Lactisol, one inhibitor of the flavor sweet, has a great potential to mask the taste of medicines (Table 3) [3].

Table 3. Polymer coatings.

Sr. No.	Drugs	Technique	Polymer Used
1	Pinaverium bromide	coating	Cellulose or shellac
2	Propantheline bromide	coating	L-HPC, EC
3	Ibuprofen	Air-suspension coating	Methacrylic acid copolymer (Eudragit)
4	Triprolidine HCL	Dispersion coating	HPMC
5	Dimenhydrinate	-	Eudragit or CMC
6	Cefeanel daloxate HCL	Granulation and coating	PVP, EC,HPMC
7	Enoxacin	-	HPMC, HPC,EC
8	Sparfloxacin	-	HPMC, HPC,EC, L-HPC
9	Aspirin	Rota granulation and coating	Cellulose acetate latex and triacetin
10	Famotidine	-	HEC, HPMC
11	Amoxicillin trihydrate	Granulation	MCC, L-HPC

Saponin colestolémica: foods and beverages that contain drugs and are supplemented with amino acids (such as glycine and alanine) and aromas to control the bitterness. The compositions like proteins that are useful for alleviating diseases liver, burns severe trauma, etc., with amino acids branched (proteins modified) are tasteless and odorless. The solutions oral of vitamin B, which contain sugar, amino acids and flavor of apple, lack of bitterness. The compositions liquid oral that consists in vitamin B, peat - 5 ' - I ribonucleoside (inosinate) and

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flavorings orange or fruits also have one taste improved. The compositions liquid oral that contains salts of theophylline is formulated with d - sorbitol, saccharin sodium glutamate sodium and oil of vanilla to produce one solution is less bitter than a solution of theophylline. The following table summarizes the masking of the taste of various drugs as the flavors, sweeteners and amino acids.

In course of the formation of the inclusion complex, the drug molecule only in the cavity of a complexing the agent, that is, the guest molecule forms a firm complex. The complexing agents may mask the bitter taste of the drug by either by reducing its route oral solubility in taking. Reduce the amount of the particulate drug exposed to the taste papilla will thus reduce the perception of the bitter taste. The strength Vander- Waals forces are mainly involved in the recording of complex. Cyclodextrin is the most often used, complex products as well as Channeling agents in a complex of inclusion training way for the masking of the taste of the bitter taste of the drug, either by the reduction of its solubility or to reduce the exposure of the particles of the drug to the taste buds (Table 4).

The citrate carbépentane may be formulated in a formulation liquid in taste pleasant with a bitterness reduced to 50% by the formation of a complex of 1: 1 with the cyclodextrin. The same way, 11 minutes according to the has up to fifteen minutes, and a complex inclusion of ibuprofen and hydroxy propyl - β - cyclodextrin may be formulated as a solution tasty.

Table 4. Complexing agents.

Drug	Complexing Agent	Dosage form
Benexate Hydrochloride	Cyclodextrin	Granules
Carbepentane citrate	Cyclodextrin	Oral liquid
Chloroquine Phosphate	Tannic acid	Syrup
Dimenhydrinate	Eudragit S-100	Chewable Tablet
Gymnema Sylvestra	Chitosan	Oral liquid
Ibuprofen	Hydroxy propyl -cyclodextrin	Solution

One of most of the popular approaches in the masking of the taste of bitter drugs is based on resin of exchange ion complexes (IER). IER are the polyelectrolytes of the high molecular weight of solids, and in a suitable insoluble form that can exchange their ions in movement the load equal to the surrounding medium. Exchange ions synthetic the resin has been used in pharmacy and medicine to mask the taste or controlled release of drug as early as 1950. bitter tasting drug it can be absorbed in the exchange ion of the resins, in manner effective to remove the at starting of the solution while the step to through of the mouth, the saliva, pH 6.7, is maintained in the form of intact fact the drug not to disposal, to the sense of taste. Several studies have arisen, that the exchange ion of resins is also suitable for the technology for administration of drugs.

The adsorption of drugs bitter in the resin of exchange of synthetic ions to obtain one cover of flavor has been well documented. Of resins they are been used exchange of ions as Amberlite CG 50 to mask the taste of pseudoephedrine in the tablet decongestant RONDEC to chew. An antibacterial belonging to the class of quinolones as the ciprofloxacin is has loaded in one exchange of cations and has been administered to animals. Some bitter drugs whose taste has been masked by using ion exchange resin are listed below (Table 5).

Table 5. Drugs Masked by IERs.

Drug	Ion exchange resin
Norfloxacin	Indion 204 (weak cation exchange resin)
Ciprofloxacin	Indion 234 (weak cation exchange resin)
Roxithromycin	Indion 204 (weak cation exchange resin)
Chloroquine phosphate	Indion 234 (weak cation exchange resin)

The drug which are charged usually used for the exchange ion of resins by two methods, to know that the column of process and by batch - process.

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Column Method

In the method of the column, it is passed one solution of drug strongly concentrated to through of one column of particles of resin. Since the reaction is one phenomenon of balance, the power and efficiency maximum are at best obtained, by the process of the column.

Batch Method

In the process batch wise, the solution of drug is stirred with one large number of particles of the resin to what that the equilibrium condition. The response involved during complexation.. of drug with resin are:

$$\text{Re-COO-H+} + \text{Basic drug+} \rightarrow \text{Re-COO- Drug++ H+}$$
$$\text{Re-N (CH}_3\text{) +3Cl-} + \text{Acidic drug-} \rightarrow \text{Re-N(CH}_3\text{)+3 Drug- + Cl-}$$

After of the taking of medicines are more likely, it was eluted from the of exchange cation of resins in H +, Na + or K + ions and the anions exchange of resins by Cl -, that these ions are the most abundant present in the stomach - intestine - discharge. Properties of Pharmaceutical grade resins are given below (Table 6) [4].

Table 6. Pharmaceutical grade resins.

Pharmaceutical grade resins	Indion 204	Indion 214	Indion 224	Indion 234
Applications	Taste masking of bitter drugs such as Norfloxacin, Ofloxacin	Taste masking of bitter drugs such as Azithromycin	Sustained release agent in drug formulations	Taste masking of bitter drugs such as Ciprofloxacin, Chloroquine phosphate
Matrix type	Crosslinked polyacrylic	Crosslinked polyacrylic	Styrene DVB	Crosslinked polyacrylic
Functional Group	-coo	-coo	$-SO_3$	-coo
Standard Ionic Form	+H	+H	+H	+K
Particle size range, mm	≤ 0.15	≤0.15	0.2 – 1.2	≤0.15
% Moisture	≤ 5	≤ 5	≤ 3	≤ 10
Total Exchange Capacity meq/g, dry	10.0	10.0	4.8	NA

The dispersion solid has been defined as the dispersion of one or more ingredients active in one carrier or matrix inert to the state of solid produced by one solvent of fusion (melting) or one process solvent of fusion. This can also be produced by co - precipitate process for the preparation obtained by solvent process such as, for example, co-precipitation of sulphasalzine and povidone. In this insoluble matrices or mixture of matrices it can be used for to mask the taste of medicaments.

Different approaches to the preparation of one dispersion of solids is described under-low:

In this process of melting, the drug or the mixture of drug and one carrier they are fused together by heating. Then the melted mixture is cooled and solidified quickly in ice bath by continoues stirring . then the final mass is crushed and pulverized.

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In the process, the solvent, the drug active and carrier are, dissolved in one solvent together, followed by the evaporation of the solvent and the recovery of the of dispersion of solids.

In the process, solvent of the fusion, the drug in solution is incorporated in one mass fusion of polyethylene glycol at one temperature of 70°C without detach the solvent.

The microencapsulation are used, for masking taste bitterness of the drug, In the microencapsulation the drug particles are coated by using different material. With the help of gelatin, the povidone, the HPMC, the ethylcellulose, the wax of bees, the wax of carnauba, the varnish acrylic and rubber used.

In this process bitter drugs are first coated to provide free flow of microcapsules, which are then mixed with excipients and compressed into tablets. The methods used to prepare the micro encapsulated are the suspension in the air, the coacervation, the separation of the stage, the drying by atomization and adjustment in cagelage, the coating on the container, the evaporation of the solvent and the method of centrifugation with multiple openings.
Technique extrusion of mass implies softening of the active mixture using the solvent of the mixture of soluble in water of the polyethylene, by the use of methanol and removal of softened mass by the extruder or the syringe to receive one cylinder of the section in the same segments for the use of one blade heated for formation of tablets.
A new technology of concealing the drugs with the help of emulsions, multiple has been drawn by the dissolution of the drug in the aqueous region inside the emulsion w / h / w in terms of the good stability of the preservative. The formulation is designed to release the drug to through of the oil from step in the presence of stomach - intestine - liquid.

One other way to hide the unpleasant taste of the therapeutic, the agent is to trap them in liposomes. For example, it is the incorporation in one liposomal formulation prepared with egg - phosphatidyl - choline masked the bitter taste of chloroquine phosphate of HEPES (N-2-hydroxyetylpiperzine-N, - 2- ethane sulphonic - acid) of the memory buffer to pH 7,2.

A prodrug is one precursor of a chemically inert drug chemically modified is and during the biotransformation the relatively pharmaceutically active compound release. In the present study, the bitter taste of the drug is masked by the production of microparticles of drugs with some hydrophilic the polymers, such as the Hydroxypropyl Methyl Cellulose (HPMC) and Polyvinyl Pyrrolidone (PVP) by using the spray drying art.

The adsorbate of a bitter tasting medicine can be considered as the least salivation soluble versions of these drugs. Adsorption comprising the preparation of a solution of the drug and to mix it with an insoluble powder which will adsorb the drug, the removal of the solvent, the drying of resulting in powder, and then using this dry adsorbate in the preparation of the last dosage form. Many substrates, such as veegum, the bentonite, the gel silica and silicates can be used for the manufacture of the adsorbate of drug bitter.

They have adsorbed the loperamide and phenyl propanolamine in silicate magnesium and aluminum also known under the name Veegum F to prepare a suspension to mask the taste bitter of these drugs.

The oils, surfactants, sugar alcohols and lipids effectively increase the viscosity in the mouth and the tail of the papilla taste and, by as much, are possible in the way of maskers the aroma. The granulate of acetaminophen is sprayed with the stearate stearyl molten, mixed with the carriers tablets suitable and incorporated in a formulation compressed to chewable masking the taste. It is said that the formulations with a large excess of lecithin or substances similar to lecithin control the bitter taste in pharmaceuticals. The silicate of magnesium and of aluminum with the lecithin soybean is used, to the unpleasant the taste of Talampicillin- HCl to hide.

Most of the tablets can be effectively masked by the flavor by applying inert polymer coatings, which prevent that the interaction of the drug with the taste buds. However, in trying this day have been in time and again by various workers to research and explore the use of new materials in the reduction of bad taste and improving good taste.

Granules to be reconstituted in liquid form (eg, sachets, diffusion capsules and powders) have a high proportion of pediatric and geriatric market. Many patents on the subject emphasize the importance of the same. Therefore, the masking of the taste of the granules is a priority important in the product 's development and the technologies and methods varied exist for the same, as indicated below - below. Hayward et al. They reported a granular composition of taste masking, comprising the drug core of an NSAID and methacrylate - ester - the copolymers as coating an agent for taste-masking. The method consists of the coating of the drug core with separate the layers of aqueous

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dispersions of the copolymers. The granules of the invention can be used in the production of chewable tablets, which have good palatability and good bioavailability.

You have a major challenge in the taste masking, because the majority of children formulations are syrups and suspensions, although the above mentioned methods have also have been used to improve liquid flavor and some patents in this field are barely to be mentioned. Nakona masked the taste bitter of derivatives of vitamin B1 such that the dicéthimine in formulating with menthol polyoxyethylene, of polyoxypropylene to formulate liquid oral. Prolamin used, applied as a coating only in a proportion by weight of 5% on 100% active in respect of the substance, which is coated, this which leads as a result the preparation of a suspension liquid which effectively mask the taste of the drug administered orally, which are extremely bitter. Prolamine coating is non-limiting the immediate bioavailability of the active substance Prolamine coating is effective in masking the taste of antibiotics, vitamins, dietary fiber, pain relievers, enzymes and hormones.

DISCUSSION

Taste, think about it, is a very subjective perception. According to the person who is perceived, the taste can vary in the degree varied. If we have a configuration experimental well -controlled, it is possible to have the action threshold taste accurate and reproducible. In order to quantitatively assess the sense of taste, you will need to have the following methods reported in the literature:

- Panel tests (human subjects)
- Measurement of the reaction of the taste nerve frog.
- Multi-channel taste sensor/magic tongue
- Spectrophotometric evaluation/D30 value

The plate proof is an assessment of the psychophysics of the taste stimulus. In this procedure a batch of about 5 - 10 human volunteers was formed for the taste of the assessment by the use of standard solutions fluctuate in flavor and some are unpleasent. then allocated values digital at these levels of unpleasant taste values are (eg 0.. - 5). Thereafter, the evidence of the solution have been tested and evaluated on the same scale to evaluate its bitterness.

Adult bull frogs are anesthetized intraperitoneally, and the glossopharyngeal nerve is then removed and dissected from the surrounding tissue and cut proximally. AC - amplifier and an integration of the electronics are used for each strengthen and merged the pulsed nervous. The length of the peak of the reaction integration is then taken as the size of the reaction.

The Multi-Channel - key sensor / Silvertongue is a device of detection automatic taste for detecting the extent of the bitterness of a nostrum substance. The gadget features a transducer, which consist of various kinds of layers to from lipids/polymers with the properties different, which can capture the taste of a manner similar to the sensation of taste human. The response taste is transmitted in a pattern compound in receiving power of signal from the potential of the membrane of the part. Different models of potential electrical response are acquired for substances to make different relish standards.

The ease of administration is the criterion for the choice of the forms of dosing orally. The bitterness of the Ingredients Pharmaceutical Assets (API) is the one of the issues important to the industry pharmaceutical for the formulation of the form of the dose, that which leads to a respect for the lack of patients.

Most drugs are sour due to the presence of groups amine functional, which makes the formulation which has taste unpleasant. Therefore, it is a challenge for the formulators to make certain that the sour and unpleasant relish of the nostrum is masked in particular in children and geriatric formulations. Dosage form to thereby ensure that the formulation is compatible with the patient and has the valuable product. Ion exchange resins are economical and can be incorporated into the development of a base quickly, and cost effective method of masking the taste. The resins exchange of ions are crosslinking chain polymer containing the groups forming salt in itself repetitive, the position, which has an affinity for the counter- ions loaded so opposite, characterized adsorb and bind the ions in the polymer matrix in a compensation process.

The drug boundary is desorbed or eluted from the resin-substance complex during the process of absorption in the body. The versatility of the IER as a vehicle for administration of drugs has attracted the research Pharma. Exchange resins ions are used for masking the relish, comfort free and pick out nostrum for carriage , and drug

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stabilization. The resin of the exchange cationic low to shape a carbon acid and cast-off to conceal the nostrum to form the sour cationic, a compound unrestful.

Clarithromycin is an antibiotic macrolide used in the therapy of usual child infections of the middle ear and upper the respiratory tract as well as certain forms of pneumonia, the impact on the elderly. However, the nostrum is very sour, so the oral administration of the nostrum. It is a convenient insoluble in water nostrum and has a polymorphism and the issue is the stability by hydrolysis when it is in a liquid wording for a long bout .

Commercially, it is available in form of tablets and suspensions, but these formulations have a problem of release of drug in the saliva. Therefore, it is an objective of the present study to provide an oral reconstituted suspension of clarithromycin, which can provide pharmaceutically acceptable and stable in dosage form of the API and give the public with a benefit and gainful formulation.

Clarithromycin is obtained in the form of gift sample of Ind-Swift Laboratories Limited, Punjab. Indion 204 and Indion 234 were from Ion Exchange India Ltd., Mumbai, paid. Tulsion-335 was a gift from Thermax Ltd., Pune. The gum xanthan has been obtained from HiMedia, Mumbai. The benzoate sodium, the sucrose, citrate sodium and aroma are purchased from S.D. Fein Chem. Ltd., Mumbai. Aspartame is purchased from NutraSweet Company and all the chemicals are used in any quality pharmaceutical or analytical. The evaluation of the taste of the formulation was done by volunteers within the group of ages of 21-25 years. There is a prior declaration receipt in the study protocol and consent in the letter from the volunteer.

The loading of the drug into the resin has been adjusted for various steps during processing, involve activation conditions, swelling time, rousing time, pH, such as temperature, and drug: resin ratio. Effect of the activation conditions of resin drug capacity loading activation of Indion 204, Indion 234, and Tulsion 335 is carried out by washing the person resin with deionized water, 1 N HCl and 1 N NaOH in various methods. The resin has also been subjected to the washing repeated with the water until a value pH neutral is reached. Drug Resin Complex (CDR) is achieved by adding 100 mg of the active resin, which it swelled for 45 min in a beaker and hold 50 ml of distilled water and 100 mg of the drug. The mixture was prepared as a suspension with the aid of a magnetic stirrer for 6 hours at 60 ° C. The residue of the mixture was washed with 100 ml of chloroform and filtered. Of this solution, 0.5 ml have been collected and diluted to 10 ml with chloroform. The amount of unbound drug in the filtrate was estimated spectrophotometrically at and lgr; max 486 nm.

Optimization of the concentration of the resin to a load maximum drug has been added to the resins swollen of acid enabled and medicament in a ratio of 1: 1 1: 1.5 and 1: 2-100 ml of water Deionized separated in beakers and they were stirred with a magnetic stirrer for 6 h at 60°C. The waste mixture was filtered and was washed with chloroform. The efficiency of loading the drug from the resin is estimated.

The optimization resin concentration for the maximum load of the drug is estimated by spectrophotometry. Optimization of the time of swelling the resin for the filler maximum drug Several batches of resin acid activated were soaked in a quantity of 100 ml of water deionized during 10 to 20 30, 40, 50, 60 and 70 min at a temperature of 60°C in a different cup. For each beaker, drug and resin were added in a 1: 2 ratio and the mixtures were stirred for 6 h at 60°C. The drug resin loading efficiency was estimated.

The time of swelling optimizes the resin required for the exposure up to the drug has been estimated by spectrophotometry. Optimization of the time of agitation to a load maximum drug The ratio 1: 2 of the complex resin medicament of different batches has been driven in 100 ml of water deionized during 30, 60, 120, 180, 240, 300 and 360 min with the aid of magnetic stirrer at 60°C is the efficiency and the amount of the medicine for loading of the resin approimated.

The duration of stirring optimized required for the load maximum drug was estimated by spectrophotometry. Optimization of the treatment the temperature to a maximum drug load of 1: 2 - ratio of drug-resin - of complexes of various batches was resulted in 100 ml of deionized water at different temperatures, namely 25°C, 30°C, 40°C, 50°C, 60°C, and 70°C at temp for 6 h by magnetic stirrer. The value of effectiveness charges of the drug on the resin is estimated spectrophotometrically from the bound drug. The optimized processing temperature is maintained.

Optimization of pH for the load maximum drug the ratio 1: 2 of the resin complex drug of batches separated are brought into suspension in 100 ml of solution Standard of acid hydrochloric acid and hydroxide sodium with pH 1.2, 2, 5, 6, 7 and 8 are stirrer with the help of a magnetic stirrer for 6 h at 60°C, the effectiveness of the drug load has been calculated and the pH has been optimized to the load maximum drug.

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Spectrophotometric method

In Spectrophotometric Method drug which are bitter in tase their taste is maked by adding the ingredient which are known and similar to the drug. For taste masking the formulation is add with 10 ml of distilled water in 10 ml syringe by revolving the syringe, end to end, five times in 30 seconds. By using a filter membrane the medium is filtered and spectrophotometric method is used to determined the drug concentration which are filtrated. Drug concentration value is if less the threshold concentration, then consider this drug bitter taste this taste is changed by invivo method. This automation are used to detect the result of taste masked granules of ciprofloxacin, the value of threshold which are used is almost 100 µg/ml.

Recent approaches and development of taste masking

The constitution adjustment of microcapsules for an antidote and greatly water insoluble polymeric material, typically a cellulose polymer (ethyl cellulose).

Drug are bitter in taste their taste is changed by stage dissociation coacervation For emulsion the drugs bitterness are changed by using solvent diffusion technique or by using polymers.

Coating give pleasant effect for all type of the dosage form it may be, solid dosage form and liquid dosage form. MicroCapules method were used to detect different therapeutic parameters, physical parameters or chemical parameters. The medicines show response after pass through mouth. If all parameters are under criteria then taste of the drug overall drug accepted [5].

The microcapsules method are used in Pharmaceutical industries. This include chewable tablets (Claritin) effervescent tablet (Vitamin tablets) or their powders (Eno), liquid dispersion or dispersible tablet.

Dispersible tablet

Those tablets that disintegrate in the time period of three minutes for the formulation of suspension with a pleasant taste when placed in a small amount of water. These tablets are also used direct on the tounge and guzzle it.

Adva Tab ODT techonology

This technology is discovered by APTALIS Pharmaceuticals. Some of the benefits of this technology are are described below:

- Stability (this stability include transportation and packaging of the drug)
- Favourable Taste
- Patient compliance.

Microcaps ODT techonology

This techonology is also developed by APTALIS pharmaceutics. In this techonology with the help of coating the taste of drug are chnaged. By using Polymeric method we remove the bitterness of the drug. This also give good Patient compliance and Release profile.

Evaluation of taste masking effect

Drugs are bitter in taste therefore, add flavours or API according to the chemistry of the drug to change their taste and facilitates patient with this product. Natural Sweeteners, Synthetic or Semisynthetic may be added. Preformulation parameters should be checked before incorporation and all preformulation result should be satisfied.

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Types of Evaluation

The evaluation of taste masking effect classified into two types which are:

- Subjective Methods
- Objective Methods

CONCLUSION

Taste masking of solid drugs is very difficult as compared to liquid, therefor this masking is considered challenge for the pharmaceutical industries or others. I try my best to explain different methods, or used which could be suitable for taste masking of bitter drugs. Number of automation available in the market which effectively mask the taste of drugs but require skillful application.by the use of this method there is no affect on the rate of bioavailability. By this applications or others technologies we can improve product preference. Specially for oral drug delivery, this research give importance to treat patient especially children and old. Whereas, for the improvement or new innovation in the taste masking automation need great and good skill, also the need for large area to perform experiments .

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