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Oral Films: A Comprehensive Review

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ABSTRACT
In the late 1970s, rapid disintegrating drug delivery system was developed as an alternative to capsules, tablets and syrups for geriatric and pediatric patients having problems in swallowing. To overcome the need, number of orally disintegrating tablets which disintegrate within one minute in mouth without chewing or drinking water were commercialized. Then later, oral drug delivery technology had been improved from conventional dosage form to modified release dosage form and developed recently rapid disintegrating films rather than oral disintegrating tablets. Oral disintegrating film or strips containing water dissolving polymer retain the dosage form to be quickly hydrated by saliva, adhere to mucosa, and disintegrate within a few seconds, dissolve and releases medication for oro-mucosal absorption when placed in mouth. Oral film technology is the alternative route with first pass metabolism. This review give a comprehensive detail of materials used in ODF, manufacturing process, evaluation tests and marketed products.

***Key Words*:** Oral disintegrating film, oral strip, pediatric and geriatric patients.

INTRODUCTION

Oral administration is the most preferred route due to relieve of ingestion, pain reduction, to accommodate various types of drug candidates and the most important patient compliance. Solid oral delivery systems are cheaply manufactured because they don't require sterile conditions (Patel *et al.*, 2010). Many pharmaceutical dosages are administered in the form of liquids, powders, pills and granules. Some patients especially geriatric and pediatric have problems in swallowing of tablets and capsules (Dixit and Puthli, 2009). These types of patients are always unwilling to take solid preparations.

In this condition, oral fast dissolving drug delivery system is such a peculiar approach to increase patient compliance by its quality of rapid disintegration and self-administration without swallowing and chewing (Bandari *et al.*, 2008). Oral drug delivery has been changed from conventional dosage form to modified release dosage form and oral disintegrating tablets to the oral disintegrating films. Most disintegrating tablets are fragile and unsubstantial, which require special packaging for storage and transportation. But the oral films are more pliable and compliant and easily handled (Dixit and Puthli, 2009).

Oral disintegrating film or strip can be defined as, "A dosage for that employs a water dissolving polymer which allows the dosage form to quickly hydrate by saliva, adhere to mucosa, and disintegrates within a few seconds, dissolves and releases medication for oromucosal absorption when placed on tongue or oral cavity." The sublingual mucosa having thin membrane and large veins is more permeable (Barnhart and Sloboda, 2007b). It gives instantaneous bioavailability of drugs due to rapid blood flow.

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An oral film or strips are manufactured as a large sheet and then cut into individual dosage unit for packaging (Desai *et al.*, 2012). Oral film used for local action in mouth such as local anesthetic for toothaches, oral ulcer, cold sores or teething etc. (Kumar *et al.*, 2011). Many drugs like cough remedies, antiasthamatics, antihistaminic, erectile dysfunction drugs, sore throat, gastrointestinal disorders, nausea, pain and CNS drugs can be incorporated. Other applications include the preparation of caffeine strips, multivitamins, sleeping aid and snoring aid etc.

Advantages

Oral films have some special advantages over other oral dosage forms given as follows:

- Rapidly dissolved and disintegrated in the oral cavity because of large surface area which lowers dosage interval, improves onset of action, efficacy and safety profile of therapy.
- Oral films are more flexible, compliant and are not brittle as ODTS.
- Easily handled, storage and transportation.
- Accuracy in the administered dose is assured from every strip or film.
- Pharmaceutical companies and customers practically accepted OTFs as an alternative of conventional OTC dosage forms such tablets and capsules etc. (Frey, 2006).
- Oral film is desirable for patient suffering from motion sickness, dysphagia, repeated emesis and mental disorders.
- From commercial point of view, oral films provide new business opportunity like product differentiation, promotion etc. (Manivannan, 2009).

Disadvantages

The main disadvantage of this delivery system is we cannot incorporate high dose into strip or film. Novartis consumer health's Gas-x thin strip has loaded 62.5mg of simethicone per strip (Siddiqui *et al.*, 2011), but there remain number of limitations with the use of film strips.

Table 1: Different properties of oral films (Desai *et al.*, 2012).

Properties	Flash Release Wafer	Mucoadhesive Melt Away Wafer	Mucoadhesive Sustained Release Wafer
Area	2-8	2-7	2-4
Thickness	20-70	50-500	50-250
Structure	Film:single layer	Single or multilayer system	Multilayer system
Excipients	Soluble, highly hydrophilic polymers	Soluble, highly hydrophilic polymers	Low/ non-soluble polymers
Drug phase	Solid solution	Solid solution or suspended drug particle	Suspension or solid solution
Application	Tongue (upper palate)	Gingival or buccal region	Gingival (other region in the oral cavity)
Dissolution	Maximum 60 sec	Disintegration in a few minutes, forming gel	Maximum 8-10 hrs
Site of action	Systemic or local	Systemic or local	Systemic or local

Classification of oral films

There are three types of oral films:

1. Flash release
2. Mucoadhesive melt away wafer
3. Mucoadhesive sustained release wafers

Different properties of classification of oral films are summarized in table 1.

Applications of oral films in drug delivery

Oral drug delivery by sublingual, mucosal and buccal become preferable for therapies in which immediate absorption is required including those used to manage pain, allergies, sleep problems and CNS disorders. **Topical applications,** the oral films are ideal in the delivery of active agents like analgesic or antimicrobial ingredients for the care of wound and other applications. **Gastroretentive dosage systems,** poorly soluble and water soluble molecules of different molecular weights are found in film format (Barnhart and Sloboda, 2007a). Dissolution of oral films could be initiated by the pH or enzymatic secretion of GIT and are used to treat gastrointestinal disorders. **Diagnostic devices,** Oral films loaded with sensitive reagent to allow controlled release faced to biological fluid for separating multiple reagents to allow a timed reaction within diagnostic device (Meathrel and Moritz, 2007).

ORAL STRIP FORMULATION COMPONENTS

- Active pharmaceutical ingredients
- Strip forming polymers
- Plasticizers
- Sweetening agents
- Saliva stimulating agents
- Flavoring agents
- Coloring agents
- Stabilizing and thickening agents

Active pharmaceutical ingredients

The main disadvantage of oral strip/ film is the size of the dosage form due to which high dose could not be loaded. We incorporate 5% w/w to 30% w/w of active pharmaceutical ingredients (Kulkarni *et al.*, 2003). For multivitamins, up to 10% w/w of dry film weight was loaded (Ali and Quadir, 2007). APIs can be milled, micronized or loaded in the form of nanocrystals or particles depending upon the ultimate release profile desired (Hariharan and Bogue, 2009). For bitter drugs taste required to be masked before incorporating APIs in the OS (Sohi *et al.*, 2004). To enhance the taste different techniques are used but the simplest method includes mixing and co-processing of bitter testing API with excipient with good pleasant taste called as **obscuration technique.** Regiospecific delivery of the drugs would also be required in allergy, cough, sore throat and other local oral manifestations.

Suitable drug molecules that can be loaded in the oral films/strips are given in the table 2.

Strip forming polymers

Polymers can be used alone or in contrast to get the required film properties for the preparation of oral film to prevent damage during handling and transportation (Corniello, 2006). At least 45% w/w of polymers should present because strip forming polymer is the important constituent of the OS (Franchiser *et al.*, 2007). Generally, 60-65% of water soluble polymer is suitable for OS preparation with desired properties (Lydzinski *et al.*, 2002).

Ability of polymers about formulation of desired strip (film forming capacity), visual appearance, disintegration time values are given in the table. Visual appearance of the film is transparent and free of bubbles necessary for aesthetic appeal of the films (Kulkarni *et al.*, 2010).

Properties of different polymers used in the formulation of oral films are given in the table 3.

Plasticizers

Plasticizer can be used to improve the elasticity and decrease the fragility of film by decreasing the glass transition temperature of polymer. The choice of plasticizer depends on its compatibility with polymer and the solvent type (Banker, 1966). Most commonly used plasticizers are glycerol, propylene glycol, PEG, phthalate derivatives such as dimethyl, diethyl and dibutyl phthalate, citrate derivatives

Table 2: Suitable drug molecules that can be loaded in the oral film/ strip (Sohi *et al.*, 2004).

Molecule	Dose (mg)	Therapeutic category
Acrivastine	8	Antihistaminic
Azatidine maleate	1	Antihistaminic
Cetrizine	5-10	Antihistaminic
Chlorpheniramine maleate	4	Anti-allergic
Diphenhydramine HCl	25	Antihistaminic
Dicyclomine	25	Muscle relaxant
Dextromethorphan HCl	10-20	Cough suppressant
Desloratidine	5	Antihistaminic
Famotidine	10	Antacid
Flurazepam	15-30	Anxiolytic, Anticonvulsant
Ketoprofen	12.5-25	Anti-inflammatory
Lopramide	2	Anti-diarrheal
Loratidine	5-10	Antihistaminic
Nitroglycerine derivatives	0.3-0.6	Vasodilators
Nicotine	1-15	Smoking cessation
Oxycodone	2.5-10	Opioid analgesic
Omeprazole	10-20	Proton pump inhibitor
Sumatriptane succinate	35-70	Antimigraine
Tripalodine HCl	2.5	Antihistaminic
Zolmitriptan	2.5	Anti-migraine

Table 3: Properties of different polymers used in the formulation of oral films (Kulkarni *et al.*, 2010).

Polymer Used	Disintegration Time (sec)	Appearance	Film Forming Capacity
HPMC E-15+ PEG 400	120	Transparent	Good
HPMC E-15+ Glycerin	92	Transparent	Good
HPMC K4M	-	-	Very poor
HPMC E-15+ Pullulan	-	-	Poor
HPMC E-15+ PVA	78	Transparent	Average
HPMC E-15+PVP	67	Transparent	Average
HPMC E-15+PVA+MCC	-	-	Poor
HPMC E-15+MCC	42	Semi transparent	Better
PVA	52	Transparent	Average
PVA+PVP+ Glycerine	64	Transparent	Average
PVA+PVP+ PEG 400	52	Transparent	Average
PVP	-	-	Very poor
Pullulan+PVA	-	-	Very poor
Pullulan+ Guar Gum+ Xanthan Gum+ Carragenon	19	Transparent	Best
Gelatin	-	-	Very poor
Eudragite RL-100	-	-	Very poor

like tributyl, triethyl, acetyl citrate, triacetin and castor oil. 0-20% w/w plaster concentration is used by preventing cracking, splitting and peeling of strip (Rowe and Forse, 1980).

Sweetening agents
Sweeteners are the essential constituent of pharmaceutical product for pediatric patients. Generally, two types of sweeteners are most commonly used which are natural sweeteners and artificial sweeteners. Sucrose is the major source of sweeteners; dextrose, fructose glucose and maltose are also source of sweeteners. The use of natural sugar is limited in diabetic patients (Mennella and Beauchamp, 2008), that's why artificial sweeteners are most commonly used in pharmaceutical preparations. First generation artificial sweeteners include cyclamate and aspartame while second generation include acesulfame-K, sucralose, alitame and neotame (Prakash *et al.*, 2008).

Saliva stimulating agent
To enhance the rate of production of saliva, saliva stimulating agents are added. Generally, acids such as citric acid, malic acid, lactic acid, ascorbic acid and tartaric acids are salivary stimulants. These agents are used in 2-6% w/w of weight of strip. Sweeteners also used as salivary stimulants (Mahaparale *et al,* 2012).

Flavoring agents
The choice of flavors depends on age, taste and liking of the people. Younger people like fruit punch, raspberry etc. while the geriatric patient prefer orange, lemon and mint flavor. The selection of flavor is done on the type of drug candidate. Almost 10%w/w flavors are added in oral film preparations. Cooling agents can also be added to enhance the flavor strength (McGregor *et al.*, 2004).

Coloring agents
When formulation ingredients or drug candidates are present in insoluble or suspension form pigments like titanium dioxide or FD&C approved coloring agents which are incorporated up to 1% w/w (kumar Vishwakarma *et al.*).

Stabilizing and thickening agents
To improve the viscosity and consistency of formulation, the stabilizing and thickening agents are incorporated. Natural gum, like xanthan gum, carragenan, locust bean gum and cellulose derivative are loaded up to 5% w/w (kumar Vishwakarma *et al.*).

METHODS FOR THE PREPARATION OF ORAL FILMS

Various methods for producing oral films are classified as follows:

- **Casting and drying**: (a) solvent casting (b) semi-solid casting.
- **Extrusion:** (a) hot melt extrusion (b) solid dispersion extrusion
- **Rolling method**:

Casting and Drying
a) Solvent- Casting Method
The oral film is mostly prepared by using the solvent-extraction method, in which water soluble ingredients are dissolved to form a clear viscous solution. The active pharmaceutical ingredient and other agents are dissolved in small amount of solution and combine with bulk. This mixture is then added into aqueous solution. Remove entrapped air and resulting solution is casted as film and then dried which is then cut into pieces of the desired sizes (Sapkal *et al.*, 2011).

b) Semi-solid Casting:
First of all, a solution of water soluble film forming polymer is prepared in semi solid casting method. Then resulting solution is added to insoluble polymer like cellulose acetate butyrate, cellulose acetate phthalate etc., prepared in sodium or ammonium hydroxide. Then add accurate amount of plasticizer to get gel mass. Finally cast gel mass into films by using heat controlled drums. The thickness of the film is about 0.015-0.05.

Extrusion
a) Hot-Melt Extrusion
Hot melt extrusion is widely employed method to formulate granules, sustained release tablets; transdermal and transmucosal drug delivery system. Processing film involves shaping a polymer into a film by using the heating process. Filled the hopper with drug carrier mix and is conveyed, mixed and melted by the extruder. Then die shaped melt in the desired film form. Repka *et al.* prepared chlorpheniramine maleate films by hot melt extrusion method (Nagaraju *et al.*, 2013).

b) Solid-Dispersion Extrusion
In this method, drug is firstly dissolved in a suitable liquid solvent and then this solution is incorporated in melt of PEG below 70C. The selected solvent or drug could not be miscible with melt of PEG and polymorphic form of drug precipitated in solid dispersion may affected by solvent (Ravindran, 2011).

Rolling method
In rolling method, film is formulated by preparation of premix, by adding active and subsequent formation of film (Rathi *et al.*, 2011). The pre-mix batch include film forming polymer, polar solvent and other ingredients except API added to the master batch feed tank. Then a predetermined amount of the master batch is fed by first metering pump and control valve. The desired amount of drug is added into mixer, and then blended for a sufficient time to form a homogenized matrix. A specific amount of matrix is fed into pan through second metering pump. The metering roller determined thickness of film. The film is finally formed on substrate and carrier away by the support roller. The wet is dried by using controlled bottom drying.

QUALITY CONTROL TESTS FOR ORAL DISINTEGRATING FILMS

Medicated strips are characterized by the following quality control tests:

Mechanical properties
Thickness measured the thickness of strip by micrometer screw gauge at different stages to assure uniformity in the thickness. **Dryness test** eight stages of film drying process have been identified which are set-to-touch, dust-free, surface dry, dry-to-touch, dry-hard, dry-through, dry-to-recoat and dry print-free. These tests are used to paint films but most of the studies can be adapted to evaluate pharmaceutical oral films (Sward, 1972). **Tensile strength** is a maximum stress applied to a point at which strip specimen break (DE *et al.*). It is calculated by applied load at rupture divided by the cross-sectional area of the strip by using following equation. In **Percentage Elongation** when stress is applied, a strip sample stretches and this is referred to as strain. Strain is basically the deformation of strip divided by original dimension of sample. Elongation of strip increases as plasticizer content increases (Fulzele *et al.*, 2002). **Tear Resistance** of film is role of its extreme resistance to rupture. To measure the force to start the tearing, generally low rate of loading approximately 51mm/min is employed. The maximum force needed to tear the specimen is recorded in Newton (Kapadia *et al.*, 2013). **Elastic Modulus** is the ratio of applied stress and corresponding strain in the region of approximately linear proportion of elastic deformation on the load displacement profile. **Young's Modulus** is used to determine stiffness of film. It is represented as ratio of applied stress over strain in the elastic deformation. **Folding Endurance** is calculated by repeated folding of the strip at same place until strip breaks. Many times, the film is folded without breaking is computed as the folding endurance value (Shinde *et al.*, 2008).

Morphology study
Scanning electron microscopy (SEM) at a definite magnification is used to study the morphology of study (Mashru *et al.*, 2005).

Swelling Property
By using simulated saliva solution, the swelling studies of film is carried out. Weighed every film sample and placed in pre-weighed stainless steel wire mesh. The mesh is dissolved in 15ml medium in plastic container. Determine increase in weight film at present time interval until constant weight is achieved (Peh and Wong, 1999).

Contact Angle
Goniometer determined the contact angle at room temperature. Put a drop of double distilled water on dry film surface. Image of water droplet recorded within 10sec of deposition by using digital camera. To determine angle, analyze digital picture. The contact angle was measured on both side of drop and averaged (Bettini *et al.*, 2008).

Disintegration time
For fast disintegrating oral films, the disintegrating time limit of 30 sec or less can be employed. But still no official guideline is present, this may be used as a qualitative guideline for quality control test. Generally, disintegration time for oral strip is 5-30sec (Gavaskar *et al.*, 2010).

Dissolution test
Dissolution testing can be employed by using standard paddle or basket apparatus. The choice of dissolution medium depends on the sink condition and high dose of active ingredient (Dixit and Puthli, 2009). When paddle apparatus is used sometimes dissolution test having problems because of tendency of strip to float on dissolution medium (Nishimura *et al.*, 2009).

Drug content and content uniformity
Any standard assay methods described for the specific API determine the drug content. Content uniformity is estimated by calculated the API content in individual film. Content uniformity is limited to 85-115%.

Organoleptic evaluation
Most of the people accepted products that possess features of sweetness and flavor. Special controlled human taste panels are used for product evaluation. For this purpose, invitro methods of utilizing taste sensors, specially designed apparatus and drug release by modified pharmacopoeial methods are used (Mashru *et al.*, 2005). To differentiate between sweetness level in taste making formulation, experiments by using electronic tongue measurements were performed (Anand *et al.*, 2007).

Stability testing
According to ICH guidelines Oral wafers have been stored under controlled conditions of 25°C/60% RH as well as 40°C/75% over a period of 12 months. During storage, oral wafers should be checked properly for their morphological properties, mass thickness, reduction of film thickness, tensile properties, water content and dissolution behavior (Murray *et al.*, 2004).

MARKETED PRODUCTS OF ORAL FILMS

Different products of oral films are summarized in the following table 4.

Table 4: Marketed Products of Oral Films (Arya *et al.*, 2010).

Product category	Ingredients	Indication /Application
1. Bio Films		
Energy boosters	Caffeine, green tea extract and guarana	The product maintains the energy level
Saliva promoting strip	Fruit acid extract	It is used in the dry mouth as a side effect of the other medication
Detoxification strip	Green tea extract	Green tea has been used as a traditional medicine commonly used in blood sugar, wound healing, regulating body temperature and promoting healthy digestion.
Breath freshener strip (anti-bacterial strip)	It contains mint flavor and anti-bacterial agent, cetylpyridinium chloride	It is used as mouth freshener and to stop bad odor of breath.
Male vitality strip	Macroot extract and saberian ginseng, cannamint flavor	It is used as an aphrodisiac and improves the libido in males.
Female vitality strip	Botanical ingredients such as passion flower and damiana	It is used to improve general wellbeing, increase energy and enhance mood
Vitamins and food supplements	Various vitamins, minerals and supplements	It is used for those patients who don't like to pop up tablets or soluble supplements
Appetite suppressants	Fucusvesiculosus, guarana extract and garciniacambogia	Top selling natural ingredients used for weight loss, cambogia helps to reduce the food intake by suppressing appetite
2. Bio Delivery Sciences International		
Onsolis	Fentanyl /buccal soluble film	Pain in Opioid tolerant patients
BEMA buprenorphine	Buprenorphine	Therapeutic alternative for patient with incomplete pain relief or those unable to tolerate
3. Hughes Medical Corporation		
Caffeine	2.5mg	CNS Stimulant
Diphenhydramine Hcl	2.5mg-5mg	Antihistaminic
Dextromethorphan	2.5mg-5.5-15mg	Anti tussive agent used to prevent cough
Folic acid	1m-5mg	Needed for formation of healthy red blood cells and used in anemia
Loratidine	10mmg-15mg	Allergy
Methylcobalamine	1mg	Peripheral neuropathy, diabetic neuropathy
4. Innozen Inc		
Chloraseptic relief strip	Benzocaine 3mg, BHT, corn starch, erythritol, FD&C Red 40, hydroxypropyl methylcellulose mallicacid, menthol monoammonium glycyrrhizinate, cherry flavor, polyethyleneoxide, sucralose	Occasional minor irritation, pain, sore throat and sore mouth
Chloraseptic kids sore throat relief strips	Benzocaine 2mg & menthol, grape flavor,BHT,cornstarch,erythritol,FD&C Red 40,hydroxypropyl methylcellulose, mallicacid,menthol,menthol,mono ammonium glycyrrhizinate,polyrthyleneoxide,sucralose	Occasional minor irritation, pain, sore throat and sore mouth
Suppress cough strip with Dextromethorphan	Dextromethorphan hydro bromide 2.5mg, asulfame potassium, FD&C Blue I, glycerine,menthol,natural and artificial flavors,pectin,peppermintoil,ucralose,sugar,water	Temporarily suppresses cough due to minor throat and bronchial irritation associated with cold or inhaled irritants
Suppress cough strip with menthol	Artificial flavors, ascorbic acid, aspartame, asulfame potassium, FD&C yellow 5, carrageenan, diglycerides, fatty acid esters, glycerin, menthol, sorbitan, monolaurate, sorbitol, spices,starch,water	Temporarily suppresses cough due to minor throat and bronchial irritation associated with cold or inhaled irritants

Table 4 (Cont.)

Product category	Ingredients	Indication /Application
5. Labtec Gmb H		
Ondensetron rapid film	Ondensetron 4mg and 8mg	It is used to prevent chemotherapy and radiation induced nausea, vomiting
Donezepil rapid film	DonezepilHcl 5mg and 10mg	It is used in the treatment of mild to moderately severe dementia of the Alzheimer's type
6. Paladin Labs(bioenvelop)		
Smoking cessation	Nicotine	To reduce smoking habit
Teeth whitening		Life style improvement product
Food supplements	Benzocaine, caffeine, melatonin, menthol, vipocetina	Neutraceuticals
Minerals	Chromium	Mineral supplements
Multivitamins for kids and adults	B6, B12, C:D3 for kids D3 for adults	Multivitamins supplements
Natural products	Ginseng and guarana	Aphrodisiac, appetite reducer
7. Pfizer Inc		
Listerine pocketpaks	Fresh citrus, cinnamon, cool mint and fresh burst	Dissolve instantly and kill 99% of bad breath germs
8. Prestige Brands		
Little cold sore throat strip	Ascorbic acid, pectin	Cold/allergy
Chloraseptic relief strip	Benzocaine, menthol	Sore throat
9. Novartis pharmaceuticals		
Day time Triaminic thin strip cold & cough	Dextromethorphan3.67mg, phenylephrineHcl2.5mg, acetone, alcohol, FD&C blue I, FD&CRed40, flavors, hypromellose,isopropylalcohol, microcrystalline cellulose, polacrillin, polyethylene glycol, propylene glycol, purified water, sodium polystyrene sulfonate, sucralose, titanium dioxide	It is used as nasal decongestant
Night time Triaminic thin strips cold & cough	Diphenhydramine HCl 12.5mg, phenylephrineHcl5mg, acetone, FD&C blue I, FD&CRed40, flavors, hypromellose, maltodextrin, mannitol, polyethylene glycol, propylene glycol, purified water, sodium polystyrene sulfonate, sucralose, titanium dioxide	Cough suppressant, nasal decongestant. It temporarily relieves cough due to minor throat and bronchial irritation as may occur with a cold
Triaminic thin strip long acting cough	Dextromethorphan5.5mg, acetone, alcohol, dibasic sodium phosphate, FD&CRed40, flavors, hypromellose, isopropylalcohol, microcrystalline cellulose, polacrillin,polyethylene glycol, propylene glycol, purified water, sodium polystyrene sulfonate, sucralose,titanium dioxide	It temporarily relieves cough due to minor throat and bronchial irritation as may occur with a cold
Triaminic thin strip cough & runny nose	Diphenhydramine HCl 12.5mg, phenylephrineHcl5mg, acetone, FD&C blue I, FD&CRed40, flavors, hypromellose, maltodextrin, mannitol, polyethylene glycol, propylene glycol, purified water, sodium polystyrene sulfonate, sucralose, titanium dioxide	It reduces cough due to minor throat and bronchial irritation. It relieves itchy, watery eyes due to hay fever
Triaminic thin strip cold with stuffy nose	phenylephrineHcl2.5mg, acetone, FD&C blue I, FD&CRed40, flavors, hypromellose, isopropyl alcohol, maltodextrin, polyethylene glycol, propylene glycol, purified water, sodium polystyrene sulfonate, sucralose, titanium dioxide	It temporarily relieves nasal and sinus congestion
Theraflu daytime thin strip	Dextromethorphan14.8mg, phenylepherine Hcl10mg, acetone, alcohol, FD&CRed40,flavors,hypromellose,isopropyl alcohol, polyethyleneglycol,sodium polystyrene sulfonate, polacrilin and sucralose	It reduces cough due to minor throat and bronchial irritation
Theraflu night time thin strips	Diphenhydramine HCl 25mg, phenylephrineHcl 10mg, acetone, FD&C blue I, flavors, hypromellose, mannitol, polyethylene glycol, propylene glycol, polystyrene sulfonate, polacrilin and sucralose	It is used for nasal congestion, runny nose, sneezing, itchy nose and throat etc.
Theraflu thin strips- Multisymptoms	Diphenhydramine HCl 25mg, acetone, FD&CRed40, flavors, hypromellose, maltodextrin, polyethylene glycol, propylene glycol, purified water, sodium polystyrene sulfonate, sucralose, titanium dioxide	It temporarily relieves nasal and sinus congestion

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