IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Oro-Dispersible Drug Delivery System- The Past, Present & Future

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Abstract :-

Orally dispersible/disintegrating tablets, oro-dispersible films, medicated gels and jellies, medicated chocolate, freeze-dried wafers, and medicated chewing gums are some examples of oro-dispersible dosage forms. To create ODDS, a variety of methods are employed, including solvent casting, heating and congealing, sublimation, tablet molding, spray drying, and freeze drying, direct compression. The main benefits of ODDS are its quick start of action, lack of water requirement for swallowing, higher rate of dissolving, enhanced bioavailability, ease of use for patients and compliance, commercial viability and uniqueness of offering. Various drug categories, such as NSAIDs, phosphodisasterase enzymes, antiemetics, antimigranes, and antipsychotics are administered by the use of an orodispersible drug delivery system. Due to ODDS's ability to be swallowed without the need for water, its beneficiaries include busy persons, psychiatric patients, elderly and pediatric patients, and immobile patients. The review article focuses on drug category, key ingredient, method of preparation and properties of ODDS.

keywords- ODDS, ODT, ODF, Medicated Jelly , Medicated Chocolate, Bioavailability , Paediatric, Geriatric.

Introduction:-

The idea behind oro-dispersible dose forms came from the need to give patients a more practical way to take their drugs. Orodispersible dose forms that, when inserted into the oral cavity, dissolve or disintegrate in a matter of seconds. The patient will ingest the medication in liquid form after maintaining this dose form in their mouth, as saliva will quickly breakdown it. One of ODDS's main benefits is that it dissolves and disperses drugs in saliva, initiating their pregastric absorption from the buccal cavity, pharynx, and stomach area. Pregastric absorption prevents the first pass effect and is advantageous for medications that require extensive hepatic processing. [44]

Oro-Dispersible Tablets (ODTs):- are solid dose forms that, when taken orally, dissolve or disintegrate tablets quickly. Oro-dispersible tablets, rapid melts, mouth-dissolving tablets, and fast disintegrating tablets are other names for ODT`s. [46, 47]

Oro-Dispersible Film (ODF):- Fast-dissolving, fast-disintegrating, and mouth-dissolving films are other names for oro-dispersible film (ODF). ODFs are thin polymeric film strips the size of postage stamps that are designed to dissolve or spread rapidly on the tongue without the need for water in 30 seconds. (46, 48)

Medicated Gels and Jellies (MJs):- are semisolid preparations that are translucent, transparent, or non-greasy and are intended for both internal and exterior use. A medication known as "medical jelly" is a preparation of gelatinous materials with specific dimensions and forms that is taken orally. Oral dosage forms of medicinal jelly are better suited for elderly and pediatric patients who have dysphagia. Children readily accept jelly candies because they like the taste and chewability of the sweets, which are frequently flavored with fruit juices and extracts and have a sweetness attribute. MJs have antibacterial and local anesthetic qualities, and they are mostly applied to the skin and mucous membranes. These jellyfish contain a sufficient amount of water, which evaporates to produce a localized cooling effect and a leftover layer that shields. (46, 49)

Medicated Chocolate:- That has been medicated is a very sophisticated and adaptable dish. A chocolate base is used to create medicated chocolate, and the medicine is then mixed into the base. It is referred to as the "chocolate drug delivery system" since the medicine is both absorbed by and released from the chocolate. In many ways, chocolate is an excellent medium for delivering active ingredients. (46, 50)

Overview of Various Formulations of ODDS:-

Tabal 1 Oro-Dispersible Tablet (ODT):-

Sr. No.	Drug & Category	Key Ingredient	Technique / Method of Preparation	Properties	Ref.
1	Montelukast & Bilastine	Montelukast, Bilastine, Crosspovidone	Direct compression method	Excellent drug for the urgent treatment of allergic rhinitis emergencies	1
2	Carbimazole (antithyroid drug)	Carbimazole	Direct compression technique	Better pharmaceutical properties than conventional marketed tablet	2
3	Olanzapine (typical antipsychotic)	Olanzapine, β-cyclodextrin, Crosscarmellose, sodium, Kyron T 314, PVP K30	Direct compression method	Complex of olanzapine with β- cyclodextrin & PVP K30 markedly improved the solubility & dissolution behaviour of olanzapine	3
4	Bilastine (second generation antihishamine)	Bilastine, ispaghula husk powder	Direct compression technique	Natural super disintegrants husk powder demonstrable greater disintegration & dissolution properties than most	4
				commonly used synthetic superdisintegrants	

5	Fexofenadine Hydrochloride (antihistamine)	Eudragit E100 and croscarmellose sodium	Wet granulation method	Taste masked granules using Eudragit E100. It shows disintegration time within 5-30 seconds. Wetting time (38 sec.) and high % drug released(99.40%)	5
6	Dimenhydrinate (antihistaminic antagonistic influence on H1 receptor)	Dimenhydrinate	Direct compression method	Superdisintegrants & efferverscent based , better disintergration time compared to other formulation	6
7	Loperamide HCl(antidiarrhea l-opoid receptor agonist)	Loperamide HCl ,CHPD, starch	Direct compression method	Loperamide offers a rapid beginning of action & improvement in the bioavailability of poorly absorbed drug	7
8	Bilastine (Antihistamine)	Bilastine Organoleptic Method, Superdisintegrant	Direct compression method	100 % In-vitro drug release within 10 Min. The taste of low or moderately bitter bilastine was masked by organoleptic method. Shows the best result as compared to the marketed brand of uncoated tablet of bilastine	8
9	Tadalafil Loaded Limonene	Tadalafil, Limonene	Freezedrying & direct compression method	Tadalafil-Loaded Limonene ODTs demonstrated a gastroprotective effect with superior improvement in efficacy as compared to omeprazole	9
10	Montelukast sodium (Antiasthema, allergic)	Montelukast sodium, crospovidone, sodium starch glycolate	Solvent evaporation method	Montelukast sodium is a drug of choice in treatment of asthma and allergic rhinitis	10

Table 2 - Various Formulations of Oro-Dispersible Film (ODF)

Sr. No.	Drug & Category	Key Ingredient	Techniques/Method of Preparation	Properties	Ref.
11	Depaxetime	Amber lite, Depaxetine, Pullulan, strip	Solvent casting method	Overall good taste and acceptability, Stable resinate complex	11
12	Propranolol HCl (Non selective Beta Adrenergic Antagonist) (for Migraine Prophylaxis)	Pullulan,Propylene glycol, Polyvinyl pyrollidone, citric acid,mannitol,menthol	Solvent casting method	The first pass metabolism in the liver can be avoided by developing oral thin film of propranolol HCl, oral thin film is a potential new dosage form for paediatrics, geriatrics and other populations.	12
13	Ergotamine Tartrate and Caffeine Anhydrous(a serotonin 5-HT1 receptor agonist, an antimigraine drug)	HPMC E-15, propylene glycol	Solvent casting method	Films (ET and CA) exhibited good mucoadhesion properties and shorter retention time (36-150 s)	13
14	Bilastine (Antihistamine)	Pullulan,,mannitol, citric acid	Solvent casting method	Rapid release of drug within the body, beneficial for the patient who are feared to take medications by oral route due to fear of chocking or not willing to take the drug due to taste issue.	14
15	Tramadol Hydrochloride (Analgesic, Anti- inflammatory)	Hydroxy propyl methyl cellulose-E5, Hydroxy propyl methyl cellulose E6, Hydroxy propyl methyl cellulose-E15, sodium alginate	Solvent casting method	Fast dissolving films are feasible alternative to the available conventional immediate release dosage forms.	15

16	Dexamethasone (Anti -emesis)	Microcrystalline cellulose, polyethylene glycol, hydroxy propyl methyl cellulose, polysorbate 80, low substituted hydroxypropyl cellulose	Solvent casting method	Fast disintegrating oral film containing dexamethasone is considered to be potentially useful for cancer patients with disturbances in eating & swallowing who receive radiotherapy &/or high moderate emetogenic anticancer drugs	16
17	Triclosan (broad spectrum antimicrobial agent)	Poloxamer 407, hydroxypropyl-□cyclodextrin, HPMC, xanthan gum, xylitol	Solvent casting method	That exhibits activity against a wide range of gram positive, gram negative bacteria, used in various personal care products such as toothpaste, mouthwashes, body washes, antimicrobial creams, lotions & hand soaps	17
18	Caffeine	HPMC-2910 (15cps), Sodium alginate, Kollicoat, Glycerine, Ethanol 96% Citric acid anhydrous	Solvent casting method	Especially for use in paediatrics & geriatrics	18
19	Aprepitant (post operative nausea and vomiting)	Aprepitant, Kollicoat IR, PEG 400, Mouth Dissolving,	Spraying technique	Good physico-chemical properties less dis-integration time	19
20	Prochlorperazine maleate (phenothiazine antipsychotic)	HPMC E-15, glycerol, propylene glycol, tween 80, mannitol, citric acid, sodium starch	Solvent casting method	Its is used in the prevention & treatment of nausea, vomiting associated with migraine or drug induced	20

Table 3 - Various Formulations of Medicated Jelly (MJ)

Sr. No.	Drug & Category	Key Ingredient	Techniques/ Method of Preparation	Properties	Ref.
21	Trazadone Hydrochloride (anti-depressant)	Trazadone HCl, Gelatin, Xanthan gum	Heat & congealing method	Trazadone is used primarily in the treatment of mental depression	21
22	Salbutamol sulphate jelly (short acting beta-2adrenergic receptor agonist)	Salbutamol sulphate, Gelatin, Trisodiun citrate, Citric acid	Heat & congealing method	Development of jelly candies is a result of children willingly consuming jelly candies because they admire the flavour & the fact that they are flavoured with fruit juice & extract	22
23	Ranitidine HCl (H_2 antagonist & proton pump inhibitors)	Ranitidine HCl, Pectin, Citric acid solution, Sodium benzoate	Heat & congealing method	The bitter taste of drug makes administration of the dosage form difficulty especially to paediatric patients	23
24	Vardenafil oral jelly (a phosphodiesterase inhibitors)	Vardenafil, sucrose, Sodium alginate	Heat & congealing method	The properties have made them suited especially to paediatric setting since children have become more exposed to these dosage forms	24
25	Olmesartan medoxamil ororetentive jellies (antihypertensive agent)	Olmesartan medoxamil, Almond gum, Gelatin	Heat & congealing method	These jellies improve the swallowing of the drug to the patient with dysphasic problem	25
26	Domperidone oral jelly (antiemetic)	Domperidone	Heat & congealing method	It is highly beneficial for individual with swallowing difficulties	26
27	Oral jelly of vitamin B complex	Vitamin B complex	Heat & congealing method	It is useful for paediatric & psychotic patient because use it`s like candy	27

28	Granisetron	Gelatin, Granisetron oral jelly, carrageenan	Heat & congealing method	Fastest drug release 99.40% in 15 min.	28
29	Etilefrine HCl (antihypertensive)	Oral medicated jelly, Etilefrine texture analysis, fast release, Taste masking, Bioavailability	Heat & congealing method	Palatable easily taken dosage form, rapid dissolution in saliva, rapid absorption through buccal mucosa	29
30	Valsartan oral jelly (angiotensin receptor blocker)	Valsartan, Gelatin	Heat & congealing method	New easily swallowed valsartan oral jelly by using 6% gelatin as a gelling agent which can be used as a good alternative for the readily available dosage form of valsartan with good taste masking properties	30

Table 4 - Various Formulations of Medicated Chocolate

Conclusion: -

ODDS techniques, which are more patient-centered and quality-based, will be an appealing means of giving patients their drugs orally. The patient cliff and increasingly knowledgeable and self-reliant consumers are the primary drivers of the drug delivery sector. Since they don't require water to swallow, orodispersible dose forms are helpful for busy persons, bedridden patients, psychiatric patients, and pediatric patients. Numerous pharmaceutical companies were interested in the ODDS because of its various oro-dispersible dose forms and various manufacturing procedures, which are both commercially feasible for industry. The market will undoubtedly grow in the near future due to the availability of technology, patient demands, the commercialization of various technologies, and product availability.

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