PHARMACEUTICAL PREPARATIONS AND DRUG DELIVERY

Abstract

In present chapter we have focused on different pharmaceutical dosage form and classified them on basis of their physical appearance and route of administration as well.Objectives of converting drug in to dosage form and there merits are highlighted.AProaches of formulating different dosage form and there stability is focused in current chapter.Development of pharmaceutical dosage form is art and science of inventing new dosage form by Pharmacists and pharmaceutical scientists.In this chapter we are going to introduce different concepts related to pharmaceutical prepartions and drug delivery. While the formulating dosage form both physical as well chemical parameters of excipient and drug are considered ,alligations are applied to make sure quantity of drug and excipients in formulation.Formulation of Syrups,emulsion,suspension,oralsolutions,tablet and ointment is reviewd in current chapter.Ideal properties of dosage form are highlighted.different drug deliveries like transdermal drug deliverysystem,ocular drug delivery system ,gastrointestinal drug delivery and intra uterine are discussed along with there basic components and as novel drug delivery system.

Keywords: Pharmaceuticalpreparations,dosage form and drug deliveries.

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I. INTRODUCTION TO PHARMACEUTICAL PREPARATIONS

Formulating a dosage form is multistep process in which active drug is mixed with different excipients with respect to particle size,morphism, ph, and solubility like different parameters and atlast formulation is developed.While developing any formulation we took in consideration drug excipient interaction,synergistic and other benifites from excipients,preformulation study and manufacturing procedure for pharmaceutical dosage form in different ways.Depending upon its utility and patients compliance formulation can be developed in dosage form and promoted in market with specific blend of active pharmaceutical ingredients and excipients.Numerous formulation has flooded nowdays into market,huge amount of time and money has invested in developing this formulation and are significante for physicians to prescribe and for patients to usethem.there is scope for development in this already formulated dosage form by overcoming the challenge of drugs to target the different protiens in our body.As of developed drug are able to target few protiens and show the activites.Development of pharmaceutical dosage form is art and science of inventing new dosage form by Pharmacists and pharmaceutical scientists.In this chapter we are going to introduce different concepts related to pharmaceutical prepartions and drug delivery. While the formulating dosage form both physical and chemical factors of excipients and drug are considered ,calculations are applied to make sure quantity of drug and excipients in formulation. Qunatityof drug is ensured for saftety and therapeutics response needed to be obtained from specific formulation.It also deals with study of pharmacokinetics and pharmacodynamics which is responsible for drug response to patients compliance[1]

1. Merits of Converting Drug to Dosage Form

- Accurate dose can be maintained
- Coated tablets and sealed ampoules can protect the drugs easily
- Bitter drugs can be converted into palatable dosage form by masking taste and odor
- Drug degradation can be avoided from gastric juice
- Sustained drug release can be obtained
- Drug solubility can be increased by choosing different solvents
- Different design of drug can be produced to fit in body cavities.

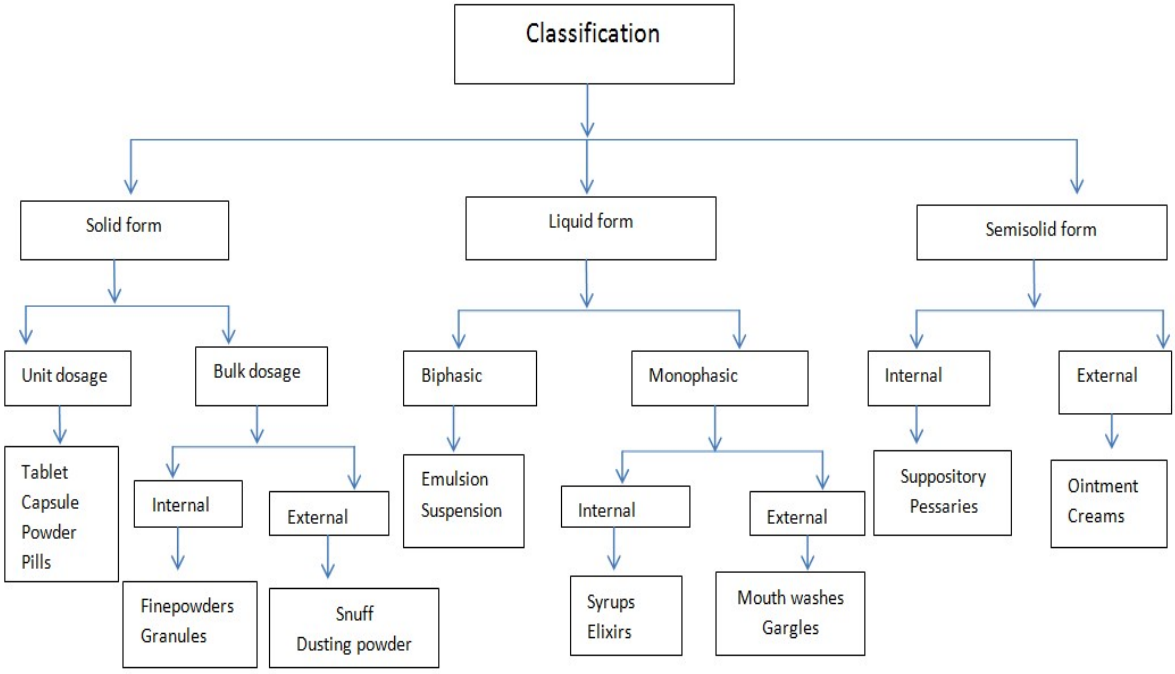

Figure 1: Classification of Dosage Form Depending on Physical State Of Matter

2. Ideal Properties of Dosage Form

- It should to be convenient to handle and use
- It should be convient and esay to store
- Should not cause instability while storing and use
- It should have enough drug strength and flexibility
- Drug should have good drug release and onset of action
- Should meet therapeutic effect
- Should not be too costly[2]

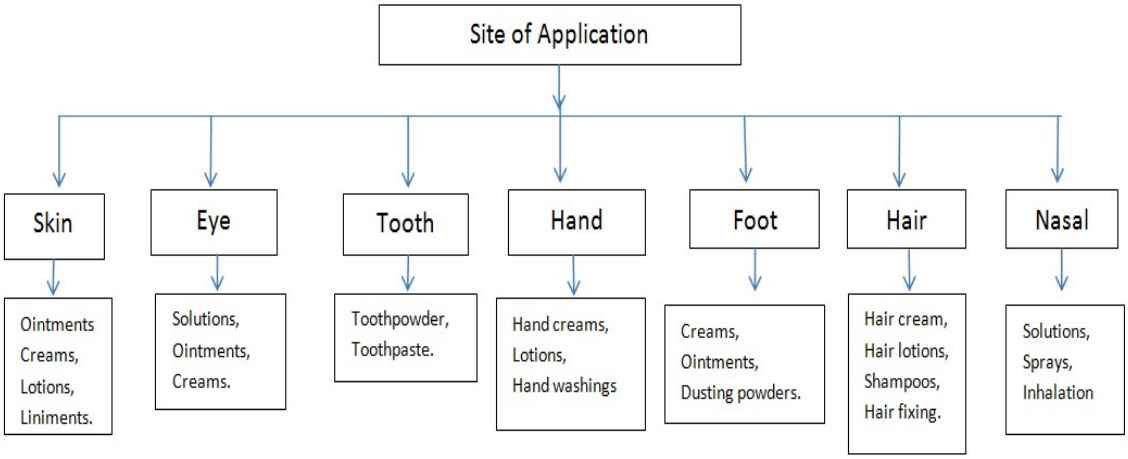

Figure 2: Classification of Dosage Form on Basis of Route of Administration.

II. DIFFERENT DOSAGE FORM

1. **Oral Solutions :**Oral solutions are most suitable type of dosage form as it is covientient to be swallowed by padeiatric and gediatricpatients.Oral solutions are blend of drug,colouring and flaouring agent together with stabilizers and preservatives.They can be prepared by different methods like chemical reaction or extraction,for an example formulation like syrup is prepared by dissolving sucrose in distilledwater or other aqueous liquids.Syrup is concentrated solutions,can be prepared in different categories as medicated and flavored. Different methods are used for preparation of syrups such as agitation by continuous stirring,by supplying heat to dissolve solute easily and prepare concentrated solutions.whenever concentration of sugar is higher there is no need of preservative as syrup itself act as preservative

2. **Elixirs:**Elixirs have pleasant and sweet flavor, observed as a clear liquids.This preparations are used for oral administration.Main ingredients involved are water and alcohol.Hence they are termed as hydro-alcoholic preparations.Such type of dosage forms are extensively used for formulation having readilydissolving therapeutic components.Other excipients like flavouring and solubilizing agents are added to enhance the effect of formulation.

3. **Suspensions:**Suspension are categorized into coarse type of dispersion as they are biphasic dosage form in which one phase is dispersed into another continuous phase such as solid particles are dispersed into liquid phase.They are easy to admininster.They provide sustained released effect due to dispersed phase as compared to simple solutions.Major challenge is to develop flocculated suspension with proper balance of zeta potential and brownianmovement.Deflocullated suspension dosent allows rapid settling of particles but cacke formation is observed after settling of particles and resuspenion is difficult in this case,hencefloculted suspension is mostly favoured as rapid settling takes place but redispersion is easy in flocullated type of suspension.Hence suspension are directed as shake well before use.

4. **Emulsions**:Emulsions are also part of coarse dispersion but they differe from suspension in term of disperse phase and continuous phase,emulsion has both phase in liquid form.One is oil phase and another is water phase,to make one pahse soluble in another emulsifying agents are used and stable type of emulsion is formulated.Depending upon concentration of oil and phase they are classified as o/w phase of emulsion or w/o phase of emulsion,as continuous phase is made of maximum concentration of component. Active pharmaceutical ingredient or drug can be added into continuous phase or dispersed phase and by adding emulsifying agent one stable emulsion is formulated.Hydrophilliclipohillic balance scale is used while preparing emulsion to make a proper balance of both the phases. Different methods used for preparing emulsion includes dry gum method, wet gum method ,bottle method or fusion method.Instability can occur in emulsion as cream formation which is reversible type of instability and flocculation ones occur it is irreversible type of instability.Emulsion are also labelledas shake well before use.

5. **Tablets:**Tablets are solid dosage form containing drug and other excipient compressed together to develop unit dosage form.Granulation is important stage in developmet of

tablets which can be done by wet granulation or dry granulation.Other excipients such as binders for good binding effect,for proper flow of granules glidants and disintegrants for proper dissolution is added.Bitter taste of tablet can be masked by adding flavoring agent and colouring agents are used to enhance the appearance of tablets.Different evaluation test are performed to evaluate the performance of tablet prepared by adding different exicipents as disintegration test,content of uniformity,friability,hardness and dissolution release pattern.

6. **Ointments:**Ointments are of generally two types medicated and non medicated used for external purpose. Various bases are utilized in the formulation of ointments. Different type of bases such as hydro-carbon, absorption, hydrophobic, and hydrophillic bases are utilized. Ointments is developed by using slab and spatula or mortor and pestle.By using levigation methods drugs is mixed into ointment base.The fusion method is also used for preparation of ointment when solid materials are not able to mix easily in and form uniform Ointments.

III. OVERREVIEW ON NOVEL DRUG DELIVERY SYSTEM

1. **Transdermal Drug Delivery System (TDDS):** It is one of the best drug delivery system categorized into category of control drug delivery which works on the basis of permeation of drug through skin at predetermined level andcontrol the release of drug into theskin.Adhesive is applied on the patches for long time skin contact and proper delivery of drug through it,drug gets penetrate through different layers and reaches to the systemic circulation.[4]
2. **Fundamental Parts of TDDS**

- **Polymer Matrix:**Polymer used for matrix development in this drug delivery are biocompatible and chemically inert in nature with respected to drug and other excipients used in system for an example penetration enhancers,they should be non reactivenon irritant and provide good stability through its shelf life and should be non harmfull till its expiry date.

- **Drug :**API is of great concern into the formulation as relese pattern will be altered depending upon nature of the drug ,they may pass through rapid first pass metabolism if they are having low therapeutic window or half life of the drug is small,which leads to need of constant dosing and causes non compliance in patient.

- **Release liner:** Before applying the patch protective liner which is applied while storage for safety is remove and patch is utilized on the skin.Liner should be developed with non toxic and non irritantpropert having inert nature to avoid reaction with skin.It is made up of paper fabric like non occlusive material and polyethylene or polyvinyl chloride like occlusive material, silicon or teflon like material is used in release coating layer.[5]

IV. OCULAR DRUG DELIVERY SYSTEM

Eye is the most probable route of topical administration.Organs includes in accessory organs of the eye are- [eyebrows,eyelids,eyelashes,the lacrimal apparatus,the extrinsic

muscles] hence eyes is most delicate organ with an unique anatomy and physiology.O/W emulsion is mostly prefferedin ODDS and PH is maintained at 7.4 while developing the eye drop.To cur the eye infection or to treat eye disorder instillation of eye drop is needed.The major focus is to formulate eye drop which can sustain the drug release and remain in eye for longer time.

1. **Advantages of ODDS are**
   - They are easy to administer
   - Low systemic side effect is osbserved in ODDS
   - Benfit of accurate dosing can be achieved.
   - They are not to much expensive[6]

V. INTRA UTERINE DRUG DELIVERY SYSTEM

Nowdays Intra uterine drug delivery is most promoising with respect to safety and economical method of contraception.Ithelps in preventing pregnancy for period os 3 to 12 years approximatelys and hence used as long-acting reversible contraception .IUD stands for intra uterine element which is a smallest T-shaped device that is used as a method of birth control designed for insertion through the cervix and placed in the uterus to prevent pregnancy.Intra uterine drug delivery has shown greater result by preventing pregnancy upto 99% by this safe method.Projection in vagina is carried out by thread or taild attached through intra uterine drug delivery.

1. **Few Side Effects of Using IUD are**
   - IUD causelocalinflammation in uteruswall which is observed after insertion of period about 24 hours. This inflammation attacks white blood cells and they produces antibody which are toxic for thesperm.
   - Not used due to highfailure rate.
   - Sides effects like Anaemia, Backaches, Spotting betweenperiods andVaginal discharge.
   - Pain during sex, Side effect of hormonalBreast cancer ,breast redness,increase in weight,mood swing and vomiting is observed.[7]

2. **Gastroretentive Drug Delivery system:**
   - It is one of the upcoming novel drug delivery system developed with aim of increase in gastric residence time which helps drug to settle for longer time in upper tract if gastrointestine and gives systemic effect.
   - These drug deliveryis followed due to its advantges and novelty as compared to conventional drug delivery.

3. **Merits of These Drug Delivery are as Follows**
   - It increases chance of drug absorption as time of residence in gastrointestinal tract increases and drug spends more time in cavity.
   - These drug delivery reduces irritation maintaing drug release at optimum and constant rate which can be controlled by polymers.
   - It is easy to administer to patients and offers good patient compliance.

4. Demerits

- Non steroidalanti inflammatory drug cannot be used in this drug delivery due side effects like gastric lesions.
- Other limitations such as drug which gets degrade in acidic environment,firstpaas metabolism and poor acid solubility cannot be used in this drug delivery system.7

VI. FUTURE PROSPECT OF DRUG DELIVERY SYSTEM

Overcomning the traditional drug delivery system we should focus on Novel drug delivery system now days,major focus is on overcoming the disadvantges of novel drug delivery,there challenges and barriers.Development of Inta uterine drug delivery system without side effect and to overcome barriers in ocular drug delivery is major future aspect.Another are to focus is developing the drug delivery for overcoming resistance developed by different dosage form.

VII. CONCLUSION

From above chapter it can be concluded that development of drug into various different dosage form has great scope and significant outputs can be obtained in market.Overcoming the traditional drug delivery and focusing on novel drug delivery has become need for currentmarket.Varoius new diseases are rasing there head now days into community which can be controlled by the help of different dosage form and new drug delivery system.

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