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A Review On "Advancements In Solid Dispersion Systems: Pharmaceutical Methods And Their Future Potential"

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ABSTRACT: Solid dispersions have attracted considerable interest as an efficient means of improving the dissolution rate and hence the bioavailability of a range of hydrophobic drugs. This article reviews the various pharmaceutical methods preparation techniques for solid dispersion and future applications. The various solid dispersions have been emphasized according to their molecular arrangement. Along with an understanding of the molecular organization of pharmaceuticals in solid dispersions, several practical considerations for the manufacture of solid dispersions are also covered, including carrier selection and physicochemical characterization techniques. One of the most popular and successful techniques for improving solubility and releasing drugs that aren't sufficiently soluble in water is solid dispersion. The correct methods for creating solid dispersions and the selection of an appropriate carrier for the active medicinal components are necessary for solid dispersion. The reliable dispersion system is made in a number of approaches to accomplish the objective and maintain clear of the associated challenges.

KEYWORDS : Solid dispersions, Bioavailability, Aqueous solubility, Solubility enhancement, Solubility.

1. INTRODUCTION :

Drugs with low water solubility often have limited oral bioavailability due to low absorption levels. Drugs with a low absorption rate can improve their dissolving rate by micronizing or lowering their size, however this promotes particle aggregation and poor wettability. Complexation with cyclodextrin, salt formation, solubilization with a co-solvent, and particle size reduction are all ways for increasing the bioavailability of drugs that are poorly soluble in water; however, each has downsides. The limitations of previous approaches were addressed with the creation of solid dispersions of low-bioavailability medications.[1] Solubility is a key physicochemical characteristic that influences medicine absorption and therapeutic effectiveness. Poor water solubility can have an impact on formulation effectiveness. The drug's poor solubility and slow rate of

dissolution in aqueous environments are the major causes of its limited bioavailability. One Numerous hydrophilic carriers that have shown promising results for increasing solubility are now being explored. Improving the solubility and dissolution of hydrophobic medicinal compounds remains one of the most difficult difficulties in drug discovery, despite the fact that the bulk of therapeutic drugs have been reinvented in recent years. Drug dissolution in an aqueous media, such as stomach fluid, is critical for improving absorption and bioavailability of orally delivered medications. Therefore, to progress bioavailability of poorly water soluble compounds like biopharmaceutical classification system class II and IV drugs, polymer matrix of various origin can be used. Various solubility enhancement methods have been introduced to triumph over this problem. There are several techniques for solubility enhancement which can be categorized into physical modification, chemical modifications for the drug substance, and other technique.[2]

More specifically, Chiou and Riegelman defined these systems as 'the dispersion of one or more active ingredients in an inert carrier matrix at solid-state prepared by the melting (fusion), solvent, or melting-solvent method', while Corrigan (1985) suggested the definition as 'a product formed by converting a fluid drug-carrier combination to the solid state'. According to this research, the key alternatives for optimizing dissolution include increasing the surface area accessible for dissolving by lowering the particle size of the solid dispersion.[3]

1.1. SOLID DISPERSION :

"A dispersion involving the formation of a eutectic mixture of drugs with water soluble carriers by melting of their physical mixtures" is how Chiou and Riegelman defined the term "solid dispersion". The dispersion of one or more active ingredients in a solid matrix or inert carrier produced by melting (fusion), solvent, or the melting solvent technique is referred to as solid dispersion.[4] After a few years, Goldberg et al. reported that not all drugs in solid dispersion might be present in a microcrystalline state; instead, a specific fraction of the drug may be molecularly dispersed in the matrix, forming a solid solution. This suggestion was made by Sekiguchi et al. that the drug was present in a eutectic mixture in a microcrystalline state.[5]

Solid dispersion refers to a class of solid goods that have at least two separate components, often a hydrophilic matrix and a hydrophobic medication. The matrix might be either crystalline or amorphous. The medication may be spread molecularly, in amorphous particles (clusters), or in crystalline particles. Solid dispersion is the solid state dispersion of one or more active substances on an inert carrier or matrix created using the melting (fusion), solvent, or melting solvent technique. This category excludes the dispersion of a medication orpharmaceuticals in a solid diluent or diluents by typical mechanical mixing. The solid dispersion was initially proposed by Mayersohn and Gibaldi.[6]

Need of Solid Dispersions :

- To improve solubility of poorly soluble drugs.
- To enhance dissolution of drug and increase its bioavailability.
- To process thermally unstable drugs using extrusion technique for manufacture of solid Dispersions.

1.2. SOLUBILITY :

A material's solubility at a given temperature and pressure is defined as the quantity that has entered the Solution when the solution and surplus, or undissolved substance, approach equilibrium. A dissolved material is called the "solute," the dissolving fluid in which the solute dissolves is called the "solvent," and the Combination of the two is called the "solution."

1.2.1.Biopharmaceutical Classification System:

The first categorization system for biopharmaceuticals was created in 1995 by Amidon and his fellow workers. The Biopharmaceutical categorization system states that a medication is considered orally active if it dissolves. In the gastrointestinal fluids, penetrates the intestinal wall, moves through the liver without becoming inactive, and then reaches the bloodstream. But amongst the various hurdles solubility is the major problem for highly lipophillic and poorly water Soluble new chemical entities. Classified active compounds into four classes according to their solubility and permeability.[7,8]

This is known as the Biopharmaceutical Classification System (BCS)

a) **Class I :** Since the chemicals are very soluble and permeable, the gastric emptying rate is the only factor that will affect their bioavailability.

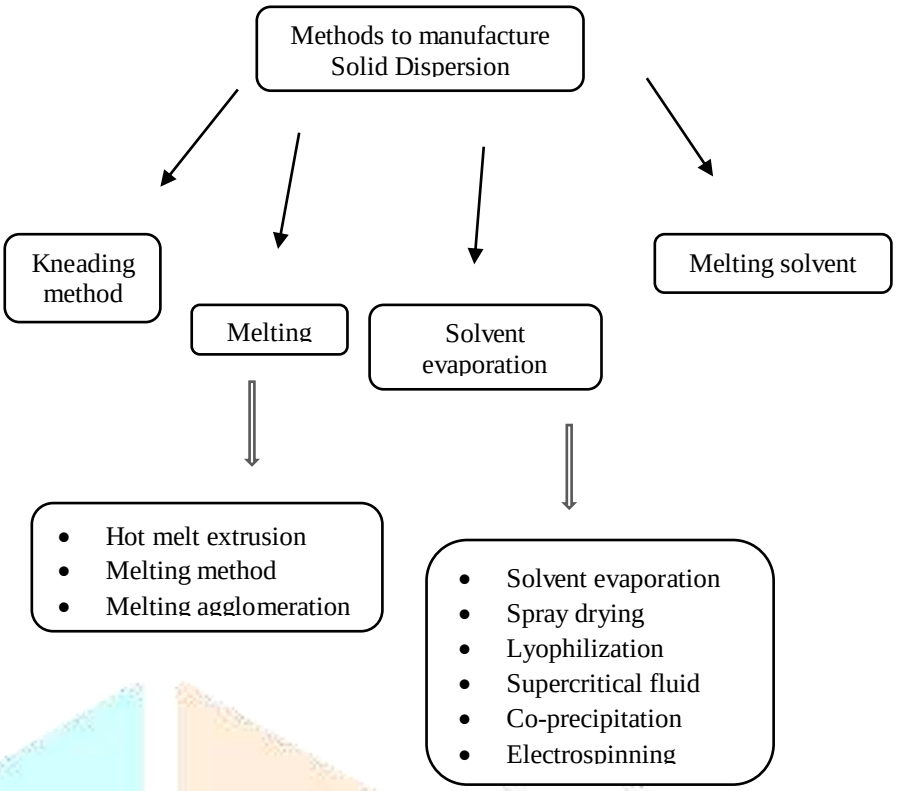
b) **Class II :** For molecules with poor water solubility and adequate permeability, dissolution is the rate-limiting Process.

c) **Class III :** compounds have sufficient solubility But poor permeability and hence the absorption rate will be determined by passage through the gut wall.

d) **Class IV :** compounds have both low solubility and low permeability, the rate limiting step will differ case by case.

Class	Solubility	Permeability	Example of drugs
Class	High solubility	High permeability	Benzapril, Loxoprofen, Sumatriptan etc.
Class	High solubility	Low permeability	Valsartan,Nimesulide,Loratadine, Aceclofenac, Glimepiride etc.
Class	Low solubility	High permeability	Gabapentine, Topiramate, Atropine etc.
Class	Low solubility	Low permeability	Hydrochlorthiazide, Furosemide, Meloxicam etc

Table.1 : BCS classification system[5]



2. CLASSIFICATION OF SOLID DISPERSION :

The drug can be dispersed molecularly, in amorphous particles (clusters) or in crystalline particles by melting or solvent method. Therefore, based on their molecular arrangement, different types of solid dispersions can be distinguished. depending on the molecular arrangement, solid dispersions can be of the following types:

2.1. Eutectic Mixtures:

Two chemicals that are completely miscible in the liquid state but only to a limited extent in a simple eutectic mixture extremely little in the solid state. It is made by quickly solidifying a fused melt of two components with perfect liquid miscibility. How ever, the solid-solid solution is insignificant. eutectic mixtures solid eutectic mixtures are usually prepared by rapidly cooling the co-melt of the two components in order to obtain a physical mixture of very fine crystals of the two components.[8]

2.2. Amorphous Precipitation in Crystalline Matrix:

This is similar to simple eutectic mixtures but only difference is that drug is precipitated out in an amorphous form.

2.3. Solid Solution:

Solid solutions, regardless of the number of components, are similar to liquid solutions in that they only have one phase. through out the drug's molecular dimensions, or particle size, have been down to the smallest possible level in the case of solid solutions, and the carrier's dissolving rate determines the rate of dissolution.

Classified as:

- According to their miscibility: continuous and discontinuous solid solutions.
- According to the way in which the solvate molecules are distributed in the solvendum: substitutional and interstitial solid solutions.

2.3.1 Continuous Solid Solutions:

All of the components of a continuous solid solution are miscible. In theory, this indicates that the two components' bonding strength is greater than the bonding strength between each component's individual molecules. Solid solutions of this type have not been reported In the pharmaceutical world till date.

2.3.2 Discontinuous Solid Solutions:

When disparate solid solutions are present, each component's solubility in the other component is limited. According to Goldberg et al. the phrase "solid solution" should only be used when the two components' mutual solubility is more than 5% due to practical issues.

2.3.3 Subsitutional Solid Solutions:

Substitution is only feasible when the solute molecules' sizes differ by less than 15% or less from the molecules in solvents. classical solid solutions have a crystaline structure, meaning that the solute molecules can either fit into the spaces between the solvent molecules or replace the solvent molecules in the crystal lattice.

2.3.4 Interstitial Solid Solutions:

In interstitial solid solutions, the dissolved molecules occupy the interstitial spaces between the solvent molecules in the crystal lattice. Solute molecule diameter should be less than 0.59 times than that of solvent molecular diameter.

2.4. Glass Suspensions:

A combination of precipitated particles suspended in glass solvent is called a glass suspension. In glass, lattice energy is substantially smaller. suspension and solution. A glass solute dissolves in the glassy solvent to form a homogeneous system known as a solution. below, the glassy state is characterized by brittleness and transparency. The temperature at which glass changes . The term glass Refers to a pure chemical or a mixture of pure Chemicals in the glassy state.[8,9,10]

Classification of solid dispersion on the basis of recent advancement:

1. **First generation solid dispersion :**

Crystalline carriers are used to create these solid dispersions. The earliest crystalline carriers were sugars and urea. That were employed to create solid dispersions. These have the drawbacks of not releasing drugs more quickly and being thermodynamically unstable.[10]

2. **Second generation solid dispersion :**

These solid dispersions are prepared using amorphous carriers instead of crystalline carriers. The drug is molecularly dispersed in the polymeric carrier. The polymeric carriers are divided into two groups:

- **Synthetic polymer** – povidone, polyethylene glycols and polymethacrylates.
- **Natural polymers –** hydroxypropyl methylcellulose, ethyl cellulose, starch derivatives like cyclodextrin.

3. Third generation solid dispersion :

A surfactant carrier, or a combination of amorphous polymers and surfactants, is present in these solid dispersions. These attain the maximum level of bioavailability. for medications with limited solubility. The third generation solid dispersion uses surfactants like poloxamer 407 and inulin, among others.[11]

Advantages of Solid Dispersion :

- In solid dispersion drugs are presented as super saturated solutions which are considered to be metastable polymorphic form. Thus presenting the drug in amorphous form and increases the solubility of the particles.
- Improved solubility and absorption, with less pre-systemic metabolism. solid dispersions are more effective than particle size reduction approaches, as the latter's limit of 2-5 mm is often insufficient to significantly increase medication solubility or release in the small intestine.
- Solid dispersion reduces particle size, improving surface area and facilitating dissolving. The rate has been obtained. Hence, bioavailability is increased.[11]

Disadvantages Of Solid Dispersion :

- Major disadvantage is their instability. They Show changes in crystallinity and a decrease in dissolution rate with ageing.
- Temperature and moisture have more deteriorating effect on solid dispersions than on physical mixtures.
- Polymers employed in solid dispersions can absorb moisture, leading to phase separation and crystal formation. During storage, materials may transition from amorphous to crystalline or meta stable to more stable structures. This may lead to lower solubility and dissolution rates.[12]

3. METHODS OF PREPARATION OF SOLID DISPERSION :

3.1. Kneading Technique :

A glass is filled with precisely weighed medicine and carriers, which are wetted with a solvent and thoroughly Kneaded. The kneading method involves using a liquid, such as water or a hydroalcoholic solution. The mixture Is added drop wise and the medication and polymers are triturated using a pestle and mortar. Kneading creates a slurry and reduces particle size, leading to increased bioavailability. After drying, the mixture is filtered through a mesh to ensure homogeneity. Satranidazole-cyclodextrin complexes were formed. In this procedure, the carrier is penetrated with water and turned into a paste. The drug is then mixed in and kneaded for a specific amount of time. The kneaded mixture is then dried and put through a sieve, if necessary.[12,13]

3.2. Spray Drying:

Spray drying has become a popular approach for producing solid medication dispersions. This method converts liquids or suspensions to dry powders in one step. This approach provides exact control over process parameters, resulting in powders with desired size, shape, density, flow properties, and crystalline forms. Spray drying involves fast solvent evaporation, which increases viscosity and traps drug molecules in the polymer matrix. Drugs with low water solubility can be spray-dried into extremely small particles if

they are soluble in certain spray-drying solvents. Spray drying can produce amorphous, crystalline, imperfect, or metastable solid particles, depending on the chemical properties of the drug used Crystals.[14]

3.3. Co-grinding:

This approach involves mixing correctly measured medication powder and carrier at a certain speed using a blender. The mixture is then loaded into the chamber of a vibrating ball mill for grinding. Strong grinding force raises the activation energy on the surface and causes deformation of the Crystal lattice and communition. Have referred to this process as mechanical activation. Grinding certain drugs, such as Griseofulvin, with microcrystalline cellulose in a vibrating ball mill can reduce crystallinity with a consequent increase in dissolution rate and bioavailability.[13,14]

3.4. Effervescent method :

Effervescent solid dispersions contain sodium bicarbonate and organic acids (citric, Tartaric, or succinic) that react to produce an effervescent mixture. Combining poorly soluble drugs with organic acids creates an effervescent solid dispersion, potentially increasing dissolving and absorption rates of medications that are poorly soluble. Citric acid/sodium bicarbonate was shown to be the most effective carrier for releasing prednisone and primidone, whereas sodium bicarbonate/succinic acid was the best carrier for griseofulvin.[10, 11,13]

3.5. Melting Method :

The melting or fusing approach involves preparing a physical combination of a medication and a water-soluble carrier and immediately heating it until it melts. The melting slurry is then quickly solidified in an ice bath while vigorously churning. The resulting solid mass is crushed, pulverized, and sieved. This has undergone various changes, including pouring the homogeneous melt in the form of a thin layer onto an a ferrite or stainless-steel plate and cooling it with flowing air or water on the opposite side of the plate. Under such circumstances, the solute molecule is halted in the solvent matrix due to the instantaneous solidification process. [13,14]

3.6. Adsorption on insoluble carriers:

These are also known as surface solid dispersions. This method involves suspending the support material in a drug solution, then evaporating the solvent. The resulting substance contains the medication in a “molecularly micronized” condition on the carrier surface. Adsorbents keep the concentration gradient (Cs-Ct) at its maximum, hence boosting the dissolution rate.[16]The fluidized bed system is a special technology used in these procedures. It involves the first preparation of spraying solution. By dissolving both the medication and the carrier, sugar spheres are charged into a fluidized bed granulator and coated.[17]

3.7. Solvent Method :

In this procedure, the physical combination of drug and carrier is dissolved in a common solvent and evaporated until a transparent, solvent-free film remains. The film is subsequently dried to a consistent weight. The solvent approach has the major benefit of preventing thermal breakdown of medications or carriers due to the comparatively low temperatures necessary for the evaporation of organic solvents. [18]

3.8. Dropping method:

This methodology, created 42, aims to address challenges in the other method and improve its effectiveness. crystallization of various chemicals is a novel method for creating spherical particles from molded solid dispersions.[18]Pipette a solid dispersion of a melted drug carrier mixture and drop it onto a plate to form round particles. Factors such as melt viscosity and pipette size can affect particle size and form. The dropping approach eliminates the need for organic solvents and avoids the issues associated with solvent evaporation.[19]

3.9. Melting Solvent Method (Melt Evaporation) :

It includes preparing solid dispersions by dissolving the medicine in a suitable liquid solvent and then integrating the solution directly into the melt of polyethylene glycol, which is subsequently evaporated until a clear, solvent-free film remains. The specified solvent or dissolved medication may not be miscible with the polyethylene glycol melt. Furthermore, the liquid solvent utilized may influence the polymorphic form of the drug, which precipitates as a solid dispersion.[20]

3.10. Fusion method :

Sekiguchi and Obi (1961) created the first solid dispersion using the fusion process. This method involves heating a combination of a medication and a water-soluble carrier to just above melting point and incorporating the drug into the matrix. The melting slurry is then quickly cooled and hardened in an ice bath. With vigorous stirring. The solid mass is crushed, pulverized, and sieved before being further compressed into tablets. Rapid congelling is preferred for this method as it causes drug super saturation by trapping soluble molecules in the solvent matrix by immediate solidification.[19,20]

3.11. Melt Extrusion Method :

A twin screw extruder is commonly used to process the drug/carrier mixture. The drug/carrier mixture is melted, homogenized, and then extruded and molded into tablets, granules, pellets, sheets, sticks, or powders. The intermediates can then be further treated to become regular tablets. An major feature of the hot melt extrusion approach is that the drug/carrier combination is only exposed to extreme temperatures for about 1 minute, allowing medicines that are somewhat thermolabile to be treated.[21]Solid dispersion by this method is composed of active ingredient and carrier, and prepare by hot-stage extrusion using a co-rotating twin-screw extruder. The five temperature zones are set at 100, 130, 170, 180, and185C from feeder to die.[22]

3.12. Melt Agglomeration Process :

This approach has been used to create solid dispersions in which the binder functions as a carrier. Furthermore, solid dispersions are created by heating the binder, drug, and excipient to a temperature above the binder's melting point (melt-in process) or by spraying a dispersion of drug in molten binder on the heated excipient (spray-on procedure) using a high shear mixer.[23] The rotary processor may be superior to high melt agglomeration because it allows for better temperature control and the incorporation of a larger binder content into the agglomerates.[24]has been found that the melt in procedure gives a higher dissolution rates than the spray-on procedure with PEG 3000, poloxamer 188 and gelucire50/13 attributed to immersion mechanism of agglomerate formation and growth.[25]

3.13. Electrospinning :

Electro spinning is the method of producing solid fibers from a polymeric fluid stream solution or melt fed via a millimeter-scale nozzle.[26]A high electrostatic field is applied across a conducting capillary that is connected to a reservoir containing a polymer solution or melt, as well as a conductive collecting screen.[27]Upon increasing the electrostatic field strength up to but not exceeding acritical value, charge species accumulated on the surface of a pendant drop destabilize the hemi spherical shape into a conical shape (commonly known as Taylors cone). Beyond the critical value, a charged polymer jet is ejected from the apex of the cone (as a way of relieving the charge built-up on the surface of the pendant drop.[28]

3.14. Super Critical Fluid (Scf) Technology :

This technology was introduced in the late 1980s and early 1990s, and there are numerous experimental proofs of concept in the scientific literature for a wide range of model compounds from various fields, including drugs and pharmaceutical compounds, polymers and biopolymers, explosives and energy materials, superconductors and catalyst precursor dyes, and biomolecules such as proteins and peptides.[29] From the very beginning of supercritical fluid particle production research, the synthesis of biocompatible polymer and drug loaded biopolymer micro-particles for pharmaceutical purposes has been extensively explored by a variety of researcher groups.[30]

4. POLYMER USED IN SOLID DISPERSION :

1. Polyethylene glycol (PEG)
2. Polyvinyl pyrrolidone (PVP)
3. Hydroxypropyl methylcellulose (HPMC)
4. Cellulose Derivatives.

4.1. Polyethylene Glycol (PEG) :

4.1.1) General features of PEGs Polyethylene glycols (PEGs) are ethylene oxide polymers with molecular weights (MWs) ranging from 200 to 300,000. PEGs with molecular weights ranging from 1500 to 20,000 are commonly used to produce solid dispersions and solutions.[31] PEGs are fluid at MW up to 600, vaseline-like at 800-1500, waxy at 2000–6000, and hard, brittle crystals at room temperature at MW 20000 and higher.[32]

4.1.2) Effect of PEG chain length PEGs with MW4000±6000 are commonly utilized for solid dispersions due to their high water solubility, ease of hygroscopy, and melting points over50°C. When a PEG with a low MW is utilized, it might result in a product with a sticky consistency that is difficult to manufacture into a pharmaceutically acceptable product.[33]

4.1.3) Effect of the drug/PEG ratio One of the most important factors influencing a solid dispersion's performance is its drug/carrier ratio. If the medication is overly concentrated in the dispersion, it will form tiny crystals rather than staying molecularly distributed. On the other hand, if the carrier % is extremely high, the drug's crystallinity can be completely eliminated, resulting in substantial gains in solubility and release rate.[34,35]

4.2. Polyvinylpyrrolidone (PVP) :

4.2.1) General features of PVP Polymerization of vinyl pyrrolidone produces polyvinyl pyrrolidone (PVP) with molecular weights ranging from 2500 to 3 000 000. These may be classed based on their K value, which is computed using Fikentscher's equation.[34]PVPs, like PEGs, have high water solubility and can increase the wettability of dispersed compounds in a variety of applications.[36]

4.2.2) Influence of PVP chain length The chain length of the PVP has a substantial impact on the rate of medication dissolution from the solid dispersion. The water solubility of PVPs decreases as chain length increases, and high MW PVPs have a substantially greater viscosity at a given concentration.[37] Studies using coevaporates of chloramphenicol and PVP demonstrated that chloramphenicol dissolution was slower when higher MW PVPs were utilized as the carrier.[38]

K value	Approximate molecular weight
12	2500
15	8000
17	10000
25	30000
30	50000
60	400000
90	1000000
120	3000000

Table. 2 : K values of PVP and the corresponding molecular weights[33]

4.2.3) Drug:PVP ratio Similar to PEG, solid dispersions made with high proportions of PVP have higher drug solubility and release rate than those created with high amounts of drug. For albendazole, for example, increasing the percentage of PVP in the dispersion increases the release rate[40]. Doherty and York investigated the release behavior of furosemide/PVP dispersions in relation to the degree of crystallinity of the preparation.[41]

4.3. Polyvinylalcohol (PVA), Crospovidone(PVP-CL), Polvinylpyrrolidone-Polyvinylacetate Copolymer (PVP- PVA) :

All three polymers belong to the polyvinyl category.Crospovi swells when dispersed in water, unlike polyvinyl alcohol (PVA) and vinyl pyrrolidone/vinylacetate (PVP-PVA) copolymers, which are both water soluble.[43] Solid dispersions of nifedipine produced with carrier solutions including nicotinamide and PVP, hydroxypropyl methylcellulose (HPMC), or PVA in a drug/nicotinamide/polymer ratio of 1:3:1 dissolved 20 times faster than the drug alone.[44] However, the two carriers, HPMC and PVP, performed even better. Studies using the cytostatic medication HO-221 revealed that the PVA/PVP solid dispersion not only

dissolved 25 times quicker than the drug powder, but also increased the bioavailability in beagles by a factor of 3.5.[44,46]

4.4. Cellulose Derivatives :

4.4.1) General characteristics of cellulose derivatives -

Celluloses are naturally occurring polysaccharides found throughout the plant kingdom. They are made up of large molecular weight, unbranched chains with saccharide units joined together by b-1,4-glycoside linkages. Since each glucose unit has three hydroxyl groups that can be derivatized, the average substitution grade (SG) cannot exceed three, unless of course the hydroxyl groups on the substituents the mselves (e.g. in the case of HPMC) are also derivatized.[48]

4.4.2) Carboxy methylethyl cellulose (CMEC) is related to cellulose ethers, but unlike many of them, it is resistant to dissolving under stomach (acidic) conditions.[50]It dissolves easily at pH levels above 5±6, with the lowest dissolving pH depending on the grade of CMEC. CMECs also dissolve quickly in acetone, 70% isopropanol, 60% ethanol, and a 1:1 combination of dichloromethane and ethanol. At pH 6.8, amorphous solid dispersions of nifedipine and spironolactone exhibit substantial increases in drug dissolution rate.[51,52]

5. FUTURE APPLICATIONS :

Over the last 20-30 years, solid dispersions have shown effective in enhancing the release rate and oral bioavailability of poorly soluble medicines. The most common problems with solid dispersions have been the capacity to scale up the manufacturing process, the physical stability of the dispersion, and the quantity of carrier necessary to achieve the requisite increase in release rate. When a high carrier/drug ratio is required, the amount of dispersion necessary to provide the standard dosage of the medicine may be too large to generate an easily taken tablet or capsule. The higher the unit dose of the drug, the more likely this problem is to occur. Despite these issues, various goods incorporating solid dispersions are now available on the market, and the number is projected to grow significantly in the coming years. Two trends point to an expanding relevance for solid dispersions in pharmaceutical development: an increasing number of poorly soluble therapeutic candidates, and significant advancements in solid dispersion production technologies in recent years. The use of hot melt extrusion in the creation of solid dispersions is a particularly significant breakthrough for the scaling up of solid dispersion manufacturing. Aspects that still need to be addressed in the next years include further improvements in manufacturing on a large scale, and better predictions of whether a particular drug/carrier combination will lead to a true solid solution or to a partly crystalline dispersion as well as whether the dispersion will remain physically stable during further processing and storage.[32,41,50]

6. CONCLUSION :

This study highlights the importance of solid dispersion technology in improving the solubility of poorly water-soluble pharmaceuticals. It is an advanced method. Before creating a novel solid dispersion system for a medicine, it's important to analyze the chemical characteristics of both the drug and the carrier to ensure a good match. The preparation process and carrier ratio significantly impact medication solubility and dissolution rates. Solubility is a most important parameter for the oral bio availability of poorly soluble

drugs. Dissolution of drug is the rate determining step for oral absorption of the poorly water-soluble drugs, which can subsequently affect the in vivo absorption of drug. Solid dispersion technology is one of the possible modes that increase the solubility of poorly soluble drugs. The various technologies discussed have been successful in the laboratory as wellas the scale-up. Some products have been marketed using technologies like the surface-active carriers. Hence these technologies are expected to form a basis for the commercialization of many poorly water-soluble and water-insoluble drugs in their solid-dispersion formulations in the near future.

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