

# Review on Natural Excipients Used In Pharmaceutical Formulation

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**Abstract-** The herbal or natural excipient have a great advantage over their synthetic analogues as these are non – toxic, less expensive and freely available. The increasing awareness about these herbal excipient mainly polymers and natural origin. The plant derived gums, mucilage from natural source like agar, gum acacia, tragacanth, starch and many more common requirements of pharmaceutical excipients. Natural excipient are used in pharmaceutical formulation as Binders, Diluents, Lubricants, Disintegration, Glidants, Coating , Colouring agent, Flavouring agent, Sweeteners, and Preservatives. Easily available and preferred to semi synthetic and synthetic excipient because of their lack of toxicity, low cost, bioavailability, non-irritant and soothing action most impudent in nature. The review describe the major current trend in cosmetic and cosmeceuticals are including towards natural or herbal formulations.

**Keywords-** Natural excipients, disintegrates, diluents, binders, sweeteners, flavouring agent, colourants.

## I. INTRODUCTION

Excipient are used as medium for giving a medicament known as excipient. The excipient play role for determining quality of drug, bioavailability and formulation of drugs from tablets. Now due to advance of technique wide varieties of excipient are used in formulation of dosage forms. The increasing awareness about these herbal excipient, which are mainly polymers of natural origin, the pharmaceutical industries is getting more inclined towards their use in formulation developments. In plant derived gums, mucilage's natural sources like carrageenan, storax, agar, gum acacia, and starch and many more pharmaceutical excipients. These can be preferred for formulation development as being stable and involving less regulatory issues as compared to synthetic counter parts. Thus present study aims to throw light on the potential of natural excipients which can be proposed to be used diluent, binders, disintegrate, as well as lubricants in various type of formulations as they are biocompatible and capable of giving additional development dosage forms.

Natural excipient to deliver the bioactive agent has been hampered by the synthetic materials. However advantages of offered by these natural excipients are their

being non-toxic, less expensive and freely available. The performance of the natural excipient determine the quality of medicines.

## CLASSIFICATION OF EXCIPIENTS:

- Binders and diluent
- Lubricant, glidants, disintegrate
- Polishing film former, coating material
- Plasticizer, colouring agent
- Suspending agent, preservatives
- Flavouring , sweeteners, taste improving agent
- Printing ink, dispersing agent gum
- Emulsifying

## ADVANTAGES OF HERBAL EXCIPIENTS:

- Naturally occurring polymer produced by all living organism. They show no adverse effects on the environment or human being.
- Chemically all of these plant material are carbohydrates in nature and composed of repeating monosaccharide units. Hence they are non-toxic.
- They are cheaper and their production cost is less than synthetic material.
- They are from a natural source and hence, safe and without side effects.
- In many countries they are produced due to their application in man.

## DISADVANTAGE OF NATURAL EXCIPIENTS:

- During production, they are exposed to external environment and hence, they are change of microbial contamination.
- Synthetic manufacturing is controlled procedure with fixed quantities of ingredients while production of natural polymers is dependent on environment and various physical factors.
- Due to difference in the collection of natural material at different time, as well as difference in region, species, and climate conditions the

percentage of chemical constituent present in a given material may vary.

- As a production rate is depends upon the environment and many other factors, it can be changed. So natural polymer have a slow rate of production.
- There are changes of heavy metal contamination often associated with herbal excipients.

#### SIGNIFICANCE OF SUBSTANCE OF NATURAL EXIPIENTS:

Pharmaceutical excipient can be defined as the non-active ingredient that are mixed with therapeutically active ingredient compound to form medicines. The ingredient which is not an active compound is regarded as an excipient. The variability active compound, excipient and process are obvious components for the product variability natural excipient and derivative occur throughout the plant and animal kingdoms. These polymer such as natural gum and mucilage are biocompatible cheap and easily available are preferred to semi synthetic and synthetic excipient because of their lack of toxicity, low cost, availability, soothing action and non-irritant nature.

#### COLORANTS:

Colorant\colour additives a substance that is added or applied in order to change the colour of a material or surface. Colorant can be used as many purpose including printing, painting, and for colouring many type of material such as foods and plastics. Colorant work by absorbing varying amount of high at different wavelength (or frequencies) of its spectrum, transmitting (if translucent) or reflecting the remaining light in straight lines or scattered.

Most colorant can be classified as dyes pigment, or containing some combination of these typical dyes are formulated as solution while pigment are made up of solid particles suspended and are generally suspended in a substance is a vehicle (e.g linseed oil ). The colorant imparts to a substance is medicated by other ingredient it is mixed with such as binders and filter added for examples in paint and inks.

In addition to their dye-yielding characteristics some of these plant also process medicinal value. The use of natural product together with their therapeutic properties is an ancient as human civilization and for a long time mineral, and plant and animal products were the main source of drug.

#### CLASSIFICATION:

- Natural dyes obtained from plants: berry, flower, bark, leaf, seed etc. (e.g catechu, pomegranate).
- Natural dyes obtained from insects: cochineal and lac.
- Natural dyes obtained from mineral: ochre, malachite, manganese. SWEETNERS:

A sugar substitute is a food additive that provide a sweet taste like that a sugar while containing significance less food energy than sugar making zero- calorie or low- calorie sugar. Artificial sweeteners may be derived through manufacturing of plant extract or processed by chemical synthesis. Sugar alcohol such as erythritol, xylitol, and sorbitol are derived from sugars. In 2017, sucralose was the most common sugar substituent used in the manufacture food and beverages.

Honey: Honey is a sweetener made by bees from plant nectar. Honey contains trace amount of vitamins and minerals. The colour and flavour of the honey depends on the source of the nectar (clover, buckwheat, orange blossom, etc..) infants under one year of age should not consume honey.

Chemical constituents: however generally honey has a content of 80-85% water, 0.3% proteins, 0.2% ashes and minor quantities of amino-acids, phenols, pigments and vitamins.

Pharmacological actions: the mechanism of action honey include mainly its interference with multiple molecular targets and cell signalling pathway such as apoptotic, anti-proliferative or cell cycle arrest, anti-inflammatory, estrogenic modulatory, angiogenesis modulatory.

Use of honey: used in anti- inflammatory, antioxidant and antibacterial agent. People commonly use honey orally to treat coughs and topically to treat burns and promote wound healing.

#### BINDERS:

Binders excipient are formulated to act as an adhesive to literally bind together powders, granules and other dry ingredient to impart to the product the necessary mechanical strength. They can also give volume to low active dose tablets. Commonly used in wet granulation, binders are added to create a more effective and predictable granule formulation.

Binders are classified according to their application. For example, solution binder are dissolved in a solvent, such as gelatine, cellulose, cellulose derivative,

polyvinylpyrrolidone, starch, sucrose, and polyethylene glycol.

Binder's square measure the agent utilized to important cohesiveness or adhesion to the granules. This ensure that the pill remain intact when compressed in addition to the flow qualities by the formulation of granules of derived hardness and size. The employment of genus the consequence of Colum biform bird pea and plantain starches on the compressional, mechanical and disintegration properties of paracetamol tablets are investigated starch 1500 has been tested as a wonderful binder, manufacturing a granulation that was compressible.

#### DILUENTS:

Diluent act as fillers in pharmaceutical tablets to increase weight and improve content uniformity. Natural diluent include starch, hydrolysed starch, and partially pre-gelatinized starches. Common diluent include anhydrous lactose, lactose monohydrate, and sugar alcohols such as sorbitol, xylitol and mannitol. Diluent provide better tablet properties such as improved cohesion or to promote flow. Mannitol is one of the costliest diluent, however, it is still often used due to the sensation it provide when it is used in chewable tablets. Diluent must be non-toxic, commercially available in acceptable grade, physiologically inert, and physically and chemically stable by themselves as well as in combination with active pharmaceutical ingredients (APIs).

#### DISINTEGRANTS:

Disintegrates are added to oral solid dosage forms to aid in their de-aggregation. Disintegrate are formulated to cause a rapid break-up of solid dosage form when they come into contact with moisture. Disintegration is typically viewed as the first step in the dissolution process. Examples of disintegration include crosslinked polymers, including cross linked (crospovidone) sodium corboxymethyl cellulose (croscarmellulose sodium) and the modified starch sodium glycolate. Some of the natural disintegration agent are shown below-

##### 1. *Lepidus sativum*

*Lepidium sativum* (family- cruciferac) known as asaliyo and widely used as herbal medicine and pharmaceutical excipient as disintegration agent.

##### 2. *Isapghula husk (plantago ovata)*

The seeds of *plantago ovata* were soaked in distilled water for 48 hrs and then boiled for few minutes for complete release of mucilage into water. Mucilage of *plantago ovata* at a concentration of 2% is also a good disintegration having the additional advantage of being natural.

##### 3. *Hibiscus Rosa sinensis* Linn:

Mucilage *hibiscus Rosa-sinensis* Linn. Of the malvaceae family is also known as the shoe flower plant, China rose, Chinese hibiscus. The plant is available in Indian in large quantities and its mucilage has been found to act as super disintegrate. The plant contains cyclopropanoids, methyl stercolate, methyl-2-hydroxystercolate, 2-hydroxystercolate malvate and B-Rosa sterol.

#### FLAVOURS& PERFUMES:

Since primeval times flavour and fragrance has been an element of our life. We have been making it a part of life. By different means we all utilize perfumery and flavour material in our everyday life. Fragrance have a key part in religious ceremonies as it was considered to possess strength to cure and protect from evil. We in our routine life starting from morning till night make different uses of product for personal care and cleanliness which have perfumes. Even consumables like confectionary contain some type of perfume or flavours. Most fragrance comes naturally from many plants. This smell is known as aroma which is a Latin word and those flavours which have this aroma are known as aromatic plants. These aromas extracted from some odoriferous material called essential oils. There is no dearth of aromatic plants in India. The country is famous for its rich endowment with aromatic plants. In fact the Vedicaliterature one can find many reference of Ayurveda gandhshatra the science of odour which deals with the cosmetic and fragrance.

Flavouring material are received from no of sources, and mostly from plants such as from flowers, leaf, stem, or bark. To be employed in food merchandise, the material area unit typically extracted from the material to produce an isolate that is simply the flavour. These flavouring agent have good importance within the business of medication, particularly in camouflaging with the medicines by their indispensable flavours. Thus, they are additionally referred to as "masking agents" or "bitter blockers". The principal flavours employed in the dental merchandise area unit peppermint, spearmint, and wintergreen changed with different essential oils of anise, clove, caraway, pimento, eucalyptus and citrus fruits, menthol, nutmeg, thyme or cinnamon.

#### CLASSIFICATION OF HERBAL EXCIPIENTS:

## BASED ON SOURCE -

## 1. ANIMAL SOURCE:

E.X. bees wax, cochineal, honey, etc.

## 2. VEGETABLE SOURCE:

E.X. pectin, starch, cardamom, vanilla, etc.

## 3. MINERAL SOURCE:

E.X. bentonite, kaolin, paraffin, etc.

## 4. MARINE SOURCE:

E.X. agar, chitin, alginates, etc.

## 5. SYNTHETIC PRODUCT:

E.X. PEG's, povidone, etc.

## 1. NATURAL COLOURANT

## HENNA:

Synonym: Egyptian private, mignonette, mahendi.

Biological source: dried leaves of *LOWSONIA INERMIS*,

Family: Lythraceae

Geographical source: North Africa, India, srilanka.

Chemical constituent: lawsone (2,5 dihydroxy-1,4-naphthoquinone), phenolic glycosides, xanthene, flavonoids, fats, resin, tannins.

Chemical test: on addition of acid in decoction of henna, orange red colour vanishes, on addition of alkali colour darkness.

Application: as hair dye, colourant, in other cosmetics.

## 2. SWEETNER:

Synonym: honey leaf, sugar leaf

Biological source: extracted from plant *STEVIA REBAUDIANA*.

Family: compositae.

Geographical source: Paraguay, south Brazil, japan, south East Asia, USA, etc.

Chemical constituent: diterpene glycoside, stevioside.

Application: natural calorie freesweetener in liquid or solid foods, beverages, substituent for conventional sugars.

Sweetening agent of choice for diabetic patients.

## 3. NATURAL BINDERS:

## ACACIA:

Synonym: Indian gum, babul.

Biological source: it is dried gummy exudation from the stem & branches of *ACACIA ARABICA*, *A. SENEGAL*.

Family: leguminosae.

Description: it occurs as yellowish white or white flakes, spherical spheres, powder, granules, or spray dried powder.

Chemical constituent: arabinose, galactose, rhamnose, & glucuronic acid.

Chemical test: when acacia powder is treated with lead sub acetate, it gelatinizes the aqueous solution.

Uses: as a natural binder for tablets, suspending agent, thickener. As base in pastilles & lozenges.

## 4. NATURAL DILUENTS:

Synonym: Arbocel, E460, elcema, snaacel.

Biological source: it is a polysaccharide & is a structural compound found in the cells of plants, algae & few bacteria.

Description: it is white, odourless & tasteless powder varying particle sizes. Practically insoluble in water & most of the organic solvents.

Chemical constituents: with Schulz reagent cellulose shows purple colour.

Use : diluent for tablets, filter for hard gelatine capsule , helps in direct compression of granules , as a suspending agent , in manufacturing of pellets & in cosmetic & food industries.

## 5. DISINTEGRANT AGENT:

Synonym: deacetylated chitin.

Biological source: it is natural polysaccharide obtained from crab and shrimp shells.

Description: odourless, white or creamy-white powder or flakes, sparingly soluble in water & conc. Organic acids.

Chemical test: with iodine and 10% sulphuric acid, it forms deep violet colour.

Use: used in control drug delivery, mucoadhesive dosage forms rapid release, improved peptide delivery, colonic drug delivery system.

## 6. NATURAL PERFUME &amp; FLAVOURING AGENT:

Synonym: chandan

Biological source: it is volatile oil obtained by steam distillation of heartwood of *SANTALUM ALBUM* & *S. SPICATUM*,

Family: santalaceae.

Description: colourless to golden yellow in colour with pleasant woody odour, it is oily, viscous liquid, soluble in 5 volume of 70% alcohol.

Use: in aromatherapy, in cosmetic, soap, perfume, to treat common cold, bronchitis, UTI & inflammation.

**II. CONCLUSION**

This review was discussed information about various source of different herbal pharmaceutical excipient and their use in pharmaceutical formulation as binders, colouring agent, sweeteners, diluents, disintegrate, and others. These herbal excipients obtained from various natural sources such as plants, animals, marine, minerals, and microbes. The use of herbal excipients in pharmaceutical industries is gaining a lot of concentration in these days and increase day by day because they are less expensive, biodegradable, eco-friendly, non-toxic, and freely available. Preference of herbal excipients not only depends upon these qualities but they also provided health benefits as compare to synthetic chemicals. Therefore, in next upcoming years, the natural excipient used as good material for cosmetic preparations.

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