

EXPLORING THE POTENTIAL OF HERBAL EXCIPIENTS: A COMPREHENSIVE REVIEW

Ashok Kumar Sharma^{1*}, Gaurav Shukla², Nidhi Kumari², Dimple Khandelwal², Kaushik Kumar Gupta² and Kapil Kumar Karsauliya²

¹Asso. Professor, Arya College of Pharmacy, Jaipur, Rajasthan.

²Research Scholar, Arya College of Pharmacy, Jaipur, Rajasthan.

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*Corresponding Author: Ashok Kumar Sharma

Asso. Professor, Arya College of Pharmacy, Jaipur, Rajasthan.

ABSTRACT

Today the advancement of medical science is at its peak. As we know that pharmaceutical dosage form is combination of active ingredients and excipients. So pharmaceutical dosage form cannot be formulated without the use of excipients. Excipients are major part of formulation that is used as medium for delivering the medicaments. Excipients are chemically inert and improve the shelf life of products. Hence the performance of excipients decide the quality of medicine. In the present time synthetic excipients are replaced with the herbal excipients herbal excipients have the great advantage over the synthetic ones because their wide availability in nature, less toxicity, affordability, stability and eco friendly nature. The herbal excipients overcome the problem of toxicity and incompatibility of synthetic excipients in various drug delivery systems. Thus this review aims to reflect light on versatility and potential of herbal natural excipients which can be used as diluent, binder, colorants, antioxidant and preservatives in various formulation This study depicts the importance of natural excipients in pharmaceuticals and cosmetics and increase awareness about the plant based excipients used in the formulation development

KEYWORDS: Herbal excipients, Natural colorants, Natural sweeteners.

INTRODUCTION

The term excipients was derived from Latin word, which mean to receive, to gather and to take out. The substance having no significant pharmaceutical activity but added to active pharmaceutical ingredients, to get the intended properties of the formulation are called excipients. Excipients are added to formulation to make it more effective. These are inactive ingredients that are added with pharmaceutical active compound.^[1] Excipients plays a unique role in performance of API and support the safety, efficacy and quality.

Excipients are used as diluents, binders, surfactants, fillers, Preservatives and Sweeteners in Pharmaceuticals and Cosmetics.

In modern time herbal excipients replaces the use of synthetic excipients because they are cheap, non toxic and easily available. Herbal excipients are more safer as compared to synthetic ones. As the pharmaceutical industry becomes more aware of these herbal excipients,

which are mainly polymers of natural origin, it is becoming more inclined to use them in formulation development. Gums derived from plants and natural sources such as carrageenan, storax, agar, lard, gum acacia, tragacanth, complete requirements for variety of pharmaceutical excipient. When opposed to their synthetic counterparts,^[4] they can be favored for formulation development because they are more stable and have less regulatory concerns. They can also be easily customized to fit unique requirements, making them a powerful and cost-effective vehicle for delivering active medicinal components in formulation.^[5] As a result, the goal of this study is to shed light on the potential of natural excipients as a diluent, binder, disintegrant, and lubricant in a variety of preparation because they are biocompatible^[2] and give additional nutritional value to the manufactured dosage form.

Herbal excipients are very famous these days.^[3] hence therefore this review article reflects the knowledge of

herbal excipients used in various pharmaceutical and cosmetics.

Functions of excipients:- Excipients have variety of functions which are :-

1. For the specific result, the physiochemical property of excipients are taken into consideration.
2. By altering the concentration of same excipients it can be employed for different functions.
3. The excipients must not interfere with :-
 - A) Dosage form
 - B) Drug release
 - C) Stability
 - D) Acceptability

Natural excipients:- Natural excipients are those which are obtained from various natural sources like plants, animals and minerals used in the formulation . These excipients are popularly used of its non toxic, Inexpensive and less side effects.

Advantages of herbal excipients:

- Biodegradable – All living things produce naturally occurring polymers. They don't appear to have any negative consequences on people or the environment.
- Biocompatible and non-toxic –Nearly all of these plant elements are carbohydrates and are made up of monosaccharides, which repeat. They are therefore not poisonous.
- Economic – These are economical, and less expensive than synthetic excipients.
- Safe and devoid of side effects – They are from a natural source and hence, safe and without side effects.
- Easy availability – These are easily available in nature.

Disadvantage of herbal excipients:

- Microbial contamination – They are exposed to the external environment during production and hence, microbial contamination can occur.
- Variation – Synthetic production is a controlled procedure with fixed quantities of ingredients while production of natural polymers depend on environment and various physical factors.^[6]
- Rate of hydration- Natural material are collected at different time, region, climate condition so that chemical constituents^[7] percentage varies.
- Slow Process – it have slow production rate due to environmental factors
- Heavy metal contamination – Herbal excipients associates chances of Heavy metal contamination.

Ideal properties of herbal excipients:-

- They have practical applications.
- They need to be non-irritating and non-toxic.
- They should to be of a non-volatile type.
- They should be less sensible to hydrolysis, light, or temperature.
- They must to be easily available at cheap price.
- They shouldn't have a distinctive hue, smell, or flavour.
- They tend to be well soluble in lipids and water. They shouldn't interfere with the function of the preparation's active ingredient and should be compatible with it.
- They need to be inert pharmacologically.

Classification of herbal excipients:- These are classified as follows^[8]

Types of excipients	Herbal excipients
• Fillers	Plant cellulose, gelatin, lactose, sucrose and glucose
• Binders	Acacia, alginic acid, corn starch, alginate, polymers
• Disintegrants	Silicone, gellan gum , agar
• Coating agent	Gelatin, arabi , natural polymers
• Lubricants	Castor oil, mineral oil, paraffin oil
• Glidants	Vitamin D and talc
• Preservatives	Clove oil , cumin seeds, neem oil , cayenne pepper
• Antioxidant	Clove oil, turmeric, cinnamon, cocca
• Sweetening agent	Glucose, lactose, honey
• Coloring agent	Caramel, chlorophyll, carotenoids, red white root , turmeric and saffrone
• Solvents	Purified water , oils
• Chealting agents	Onion, garlic, chlorella, Brazil nuts
• Buffering agents	Lemon juice
• Surface active agents	Sky waxes, tea saponins
• Viscosity imparting agent	Gelatin, aloe mucilage, gums ,tracanth
• Emulsifying agents	Acacia gum, gum ghatti
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Types of natural excipients:

1. Fillers and Diluents:- In general, Active Pharmaceutical Ingredients (API) demonstrate the therapeutic effect in any pharmaceutical dosage form. However, API is not provided directly; instead, it is combined with excipients to create a form that is compatible with patients.^[11] These excipients, are used to bulk the formulation and dilute any liquid preparation. The main purpose of

fillers^[9] And diluents is to provide dosage forms a structural form, fill out their size, and increase their bulk volume so that they are acceptable for administration. Fillers are naturally inert and effortlessly meld with all formulation elements. Solid, semi-solid, and liquid dosage forms are employed to provide fillers and diluents.

Examples of fillers and diluents are as follows:-

Name of excipients	Sources
Cellulose	Plants
Lactose	Milk
Sucrose	Cane
Glucose	Various fruits
Gelatin	Animals

2. Binders:- Excipients, usually referred to as additives, are combined with active pharmaceutical substances to create a dose form for use in medicine. Binders are the excipients utilised to bind or hold all substances employed in the formulation of the dosage form, as the name implies.^[10] Binders are used into formulations to impart flexibility or to

strengthen the connection between the particles therein.^[9] Gripping of substance. They make sure that the formulations are produced with the physical strength and amount that are required. Binders are used either in a solution or in a dry state depending upon nature of preparation . Examples of binders are as follows:-

Name of excipients	Source
• Gum ghatti	Anogeissuslatifolia
• Albizia gum	Albiziazylgia
• Gum acacia	Acacia arabica
• Khaya gum	Khayagrandidifolia
• Tamarind seed	Tamarindusindica

3. Disintegrants:- These are excipients used in tablet formulation so that it can easily break into small fragments in aqueous surrounding and increase active surface area. Examples:- silicone, agar.

improving drug protection.^{[14][15]} Coating agents are utilised depending on the exact site of drug release, such as to avoid the stomach and to absorb the drug from the intestines. Additionally, coating agents make products more effective and protected from the outside environment. Coating agents make the formulation look better.

4. Coating agents:- Coating agents are advantageous for both humans and pharmaceutical solid dosage forms in many ways. To coat or create a film over the dosage form, coating agents are utilised. These coating methods modify the drug release while

Examples of natural excipients as coating agents are as follows:-

Name of excipients	Sources
• Gelatin	Animals
• Xanthan gum	From bacteria xanthomona scampestris
• Guar gum	Seeds of cyanmopsistertra ganalobus L taub.
• Pactin	From citrus fruits and vegetables

5. Lubricants:- The term “lubrication” refers to the use of lubricants to a process in order to make it run more smoothly. Lubricants are used to stop materials from clumping together during the formulation process. Lubricants keep formulations sticky by reducing friction between particles and processing machinery. Small amounts of lubricants are added to formulations, such as solid dosage forms¹⁸. Antiadherent qualities are something that lubricants

share. Additionally, lubricants improve product flow by lowering interparticulate friction.^{[12][13]} Lubricants typically come in two varieties. The first is hydrophilic in nature. In general, hydrophilic lubricants do not exhibit anti-adherent qualities and have poor lubricating properties. The second type of nature is hydrophobic. The pharmaceutical industry is the one that uses hydrophobic lubricants the most.

Examples of natural excipients as lubricants are as follows:-

Name of excipients	Sources
• Stearic acid	Animals
• Castor oil	Seeds of castor
• Sodium chloride	Minerals
• Paraffin oil	Paraffin plant

6. **Preservatives:-** Chemicals called preservatives are employed in the pharmaceutical, cosmetic, and food sectors. They are included in the formulation to stop microbial development from causing products to decompose. Additionally, they halt the unwelcome chemical alterations. Preservatives typically come in two varieties: anti-oxidants and anti-microbial preservatives. An anti-microbial preservative stops the growth of microorganisms to protect the product from deterioration. This very old method, which involves pickling and adding honey, prevents the growth of microorganisms by changing the pH of

the formulation.^{[19][20]} Antimicrobial preservatives are employed in formulations to lengthen their shelf lives.^[21] Anti-microbial preservatives function by hydrolyzing microorganisms, altering the permeability of microbial membranes, denaturing the enzymes and proteins that make up germs, and oxidising the cellular components of microorganisms.

Examples of natural excipients as preservatives are as follows:-

Name of excipients	Source
Clove oil	Buds of myrteaceae syzygium
Neem oil	Fruits of azadirachta indica
Cumin seeds	Seeds of cumin syminum
Turmeric	Roots of curcuma longa
Cinnamon	Bark of cinnamomum verum

7. **Coloring agents:-** The class of substances known as organoleptic agents includes colouring agents. The food, cosmetics, and pharmaceutical industries all employ colouring compounds extensively. Colouring agents help pharmaceutical compositions look more appealing.^[18] Consumers avoid using any dose form for administration if it has an undesirable colour. Colouring agents make the dose form more appealing. Additionally, colouring compounds are employed to distinguish dose forms or make dosage

forms easier to identify. Patients are psychologically drawn to dosage forms because colouring agents are used in the dosage forms. The cosmetics industry makes extensive use of colouring chemicals, which are also employed as dyes. FDA has approved or certified all colouring agents used in pharmaceutical businesses.

Examples of excipients as coloring agents are as follows:-

Colour of excipients	Source
Brown/ black	Bark of acacia catechu
Yellow	Leaf of adhatoda vasica
Red	Aloe barbadensis
Orange/ red	Seeds of bischofia javanica
Blue	Leaf of indigo tinctoria
Brown	Bark of azadirachta indica
Orange	Leaf of lawsonia inermis

8. **Antioxidants:-** Preservatives that fight free radicals are frequently utilised in many sectors. The oxidation process severely harms food and pharmaceutical products, especially those with high fatty acid content.^{[22][23]} Antioxidants stop oxidation in its tracks. Antioxidants function by preventing

oxidation chain reactions or by acting as reducing agents, and they oxidise themselves to stop the oxidation process.

Examples of natural excipients as antioxidant are as follows:-

Name of excipients	Source
Clove oil	Buds of myrteaceae syzygium
Turmeric	Roots of curcuma longa

Cinnamon	Barks of cinnamomum verum
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9. **Flavouring agents:-** The combination of taste, touch, smell, and sight creates flavours. With the aid of technology, the artificial flavouring industry produces a lot of flavours these days. In many pharmacological formulations, including sedatives, antibiotics, anti-malarials, and cough syrups, flavours are used. The food industry makes extensive use of flavours as well. The group of substances known as organoleptic agents includes flavouring agents.^{[16][17]} To cover up an unpleasant flavour or dose form, flavours are utilised as taste-

masking agents. A flavour increases the chance of the medicine and makes it more palatable for the patient to take. Children consume medications without any problems because to the flavourings used in dose forms. There are both artificial and natural flavouring agents. While natural flavourings are derived from plants, artificial flavourings are created in laboratories.

Examples of natural excipients as flavouring agents are as follows:-

Name of excipients	Source
Lemon	Peel of citrus limon
Orange	Peel of citrus sinensis
Raspberry	Fruit of rubusrosi folius
Peppermint	Leaf of menthas picata
Ginger	Roots of zingiber officinale

CONCLUSION

Throughout the most recent study the aim of this review is to collect information about different natural excipients which are obtained from natural sources such as plants, animals and minerals. Herbal excipients are advantageous because they give health benefits by getting rid of synthetic chemicals. Herbal excipients are non toxic, easily available and economical. They play outstanding role in pharmaceutical sector and cosmetics. As a result, their will be constant interest in natural excipients in subsequent years in order to develop drug delivery systems and cosmetic products. Our main aim of this article is to review efficacy of plant based excipients in pharmaceutical and cosmetics category. The study findings could ultimately be the development of herbal cosmetics.

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