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OVERVIEW OF NATURAL EXCIPIENTS: BENEIFTS AND APPLICATION IN PHARMACEUTICALS

Datta Babasaheb Chaudhari[1], Sakshi Omprakash Jaju[2*], Dr. Swati S. Rawat[3], Dr. Sunil S. Jaybhaye[4] and Jitendra Rameshwar Mundada[5]

[1]Student of Bachelor in Pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere.

[2,3,4,5]Department of Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere.

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***Corresponding Author**
Sakshi Omprakash Jaju
Department of Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere.

ABSTRACT

The role of excipients in pharmaceutical formulations has evolved from being inert, inexpensive substances to essential components that enhance drug delivery and therapeutic efficacy. Advances in drug delivery systems have led to the development of novel dosage forms, where excipients perform critical functions. Among these, herbal excipients are gaining prominence due to their numerous advantages over synthetic analogs. Derived from natural sources, herbal excipients are non-toxic, biodegradable, cost-effective, chemically inert, and widely available. Additionally, they improve product stability and align with the global shift toward sustainable and eco-friendly materials. This review highlights the potential of herbal excipients as versatile, functional ingredients in modern drug formulations, addressing their benefits, applications, and role in advancing pharmaceutical innovation.

KEYWORDS: Herbal Excipients, Natural Colorants, Natural Sweeteners, Natural Binders.

1. INTRODUCTION

An excipients is derived from the Latin word excipere that mean to receive together through the out the standard of the product depends on the production process active pharmaceutical ingredients API and excipients which are used in the formulation.[1]

These excipients give in a great way to the performance of the API which support the safety, efficacy of the product. Waste from food industry can be achieve as a raw material to extract herbal excipients pharmaceutical formulations are composed of many compounds include active pharmaceutical ingredients along with other excipients such as binder, diluents, disintegrates etc. these ingredients contribute a key role in maintaining the quality, safety and efficacy of the formulation to be manufactured several studies report that the extensive use of synthetic excipients in developing formulation poses a vexed problem due to the their toxicity, incompatibility, non-availability.[2]

From the last three decades, there is increase in use of herbal product in world's different countries. About 80% of world population use herbal products according to the primary health care needs. Herbal drugs are consider to be the safe since they are derived from the natural sources. Various parts of plant or the whole plant are introduced to several treatment like extraction, distillation, purification, concentration or fermentation to get the herbal preparations. It was estimated that people from the different countries are rely on the herbal products.[3]

2. OBJECTIVES

- **Enhancing Bioavailability:** They can improve the absorption of active ingredients in the body.
- **Stabilization:** Herbal excipients help maintain the stability and efficacy of active compounds over time.
- **Improving Palatability:** They can mask unpleasant tastes and improve the overall flavor of products.
- **Controlled Release:** Some herbal excipients enable the gradual release of active ingredients, optimizing therapeutic effects.
- **Facilitating Manufacturing:** They assist in the processing and handling of formulations, ensuring consistency and quality.
- **Reducing Side Effects:** Herbal excipients can mitigate adverse effects of active ingredients by providing a buffer.

3. DEFINITION

- **Herbal excipients**

Herbal excipients are natural substances derived from plants that are used in pharmaceutical formulations to support the stability, effectiveness, and delivery of active ingredients. They serve various roles, such as binders, fillers, disintegrants, and coatings, and can enhance the overall performance of the product while potentially offering additional therapeutic benefits. Their use helps in improving bioavailability, palatability, and the manufacturing process of herbal and conventional medicines.

- **Pharmaceutical excipients**

Pharmaceutical excipients can be defined as non-active ingredients that are mixed with therapeutically active compound to form medicines the ingredients which is not an active compound is regarding as an excipients affect the behavior and effectiveness of the drug product more and more functionality and significantly the variability of active compounds excipients and process are obvious compound for the product variability.[4,5]

4. CLASSIFICATION OF HERBAL EXCIPIENTS:

4.1 Classification according to their application and function in the drug

- Binder

Ex: Henna, Shatavari, Acacia

- Dilutent

Ex: Starches

- Lubricants

Ex: Vegetable oil

- Disintegrates

Ex: Starches

- Polishing film farming, coating agent

Ex: Gelatin

- Plasticizers

Ex : Castor oil

- Coloring agent

Ex: Henna, Turmeric, Annatto

- Suspending agent, preservatives, antioxidants etc.

Ex: acacia gum[6]

4.2 Classification is based on source

- Marine Origin: Gum Agar, Carrageenan, Algnic Acid, Laminarin
- Plant Origin: Gum Ghatti, Gum Karaya, Gum Tragacanth, And Kaya
- Seed Gums : Guar Gum, Locust Bean Gum, Starch Amylose
- Extract: Pectin, Larch Gum
- Roots: potato starch
- Animal origin: Chitin And Chitosan, Chondroitin
- Microbial origin : Bacteria And Fungal Dextran, Curdian, Zanflo.[7,8]

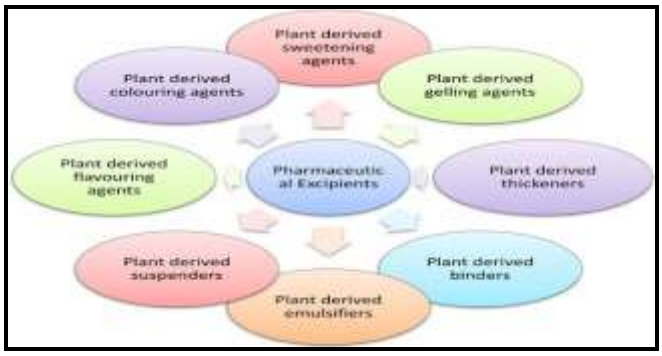

Figure 1: Plant Derived Pharmaceutical Excipients.

5. Function of herbal excipients

- Add bulk to the formulation
- During manufacturing it helps to handle active pharmaceutical ingredients
- Assist in drug administration
- Enhance patient compliance
- Enhance drug solubility and bioavailability of the active pharmaceutical ingredients
- Avoid drug degradation
- Help to mask unpleasant test, colour and odour
- Helps to maintain stability
- Prevent drug aggregation and helps in drug particles dispension
- Modify the pH and osmolality of the liquid dosage forms.[9]

6. Ideal properties of herbal excipients

- They can be used practically
- They should be non-toxic and non- irritant in nature
- They should be non-volatile in nature

- They should be easily available and cheap
- They should not have specific colour, ordour and taste
- They should possess good water and liquid solubility
- They should be pharmacologically inert.[9]

7. Advantage of herbal excipients

- Biodegradable, Biocompatible and non-toxic.
- They are less expensive then synthetic material to produce and are also less expensive to buy.
- Safe and devoid of side effects as they are natural they are harmless and have no side effect
- They are produced in numerous nations since they are used in so many different sector
- Many herbal excipients can be more cost-effective compared to synthetic alternatives, especially when sourced locally.
- Some herbal excipients possess antioxidant properties, which can help in preserving the stability of formulations.
- There is a growing acceptance of herbal excipients in regulatory frameworks, which can ease the approval process for new formulations.
- Herbal excipients often come from renewable resources, making them a more sustainable choice compared to synthetic excipients.[10]

8. Disadvantage of herbal excipients

- They are exposed to the outside environment while being produced there is a possibility of microbial contamination.
- Natural polymer creation is depends on the environment and a number of physical parameter whereas synthetic manufacturing is a regulated process with define quantities of materials.
- The processs of production of natural polymers is slow.
- The uncontrolled rate of hydration the proportion of chemical elements present in a specific substance may very due to difference in the collection of natural resource at various eras as well as differences in geography, species, and climate conditions.[10]

9. HERBAL EXCIPIENTS AND IT'S PROFILE

9.1 AGAR

Figure 2: Agar.

- **Synonym:** Agar, vegetable gelatin
- **Biological Source:** It is the dried gelatineous substances obtained from gelidium amansti
- **Family**: Gelidaceae
- **Chemical Constituents**
  - Agarose
  - Agaropectin
- **Pharmaceutical Applications**
  - Suspending agent
  - Emulsifying agent
  - Gelling agent in suppositories
  - Surgical lubricant
  - Tablet disintegrant
  - Medium for bacterial culture
  - Laxative[1]

9.2 TRAGACANTH

Figure 3: Tragacanth.

- **Synonym:** Gum Tragacanth
- **Biological Source:** It is the natural gum that comes from drive sap of astragalus gummifer
- **Family:** Leguminosae
- **Chemical Constituents**
  - Tragacanthin 8-10 % and is water soluble
  - Bassorin 60-70 % and insoluble in water
- **Pharmaceutical Applications**
  - Thickening agent
  - Demulcent
  - Suspending agent
  - Emulsifying agent
  - Emollient in cosmetics
  - Sustained release agent.[11]

9.3 HONEY

Figure 4 Honey.

- **Synonym:** Madhu, Madh, Mel
- **Biological Source:-** Honey is sweet secretion stored in the honey comb by various species of bees such as apis mellifera, apis dorsata, apis florea, apis indica
- **Family:** Leguminosea
- **Chemical Constituents**
  - Dextrose
  - Levulose
  - Sucrose and gums
  - Dextrin and gums
- **Pharmaceutical Applications**
  - Sweetnig agent

- Thickening agent
- Suspending agent
- Emulsifying agent.[12]

8.4 ALOE

Figure 5 Aloe.

- **Synonym:** Aloevera, Barbados Aloe
- **Biological Source:** It is obtained from the leaves of Aloe barbadensis
- **Family:** Asphodelaceae (Liliaceae)
- **Chemical Constituents**
- Aloin
- Barbaloin
- Beta barbolin
- Isobarbaloin
- **Pharmaceutical Applications**
- Gelling agent
- Sustained release agent.[13]

9.5 ALMOND GUM

Figure 6: Almond gum.

- **Synonym:** Badam pisin
- **Biological Source:** It is obtained from the seed of prunus amygdalus

- **Family:** Rosaceae
- **Chemical Constituents**
  - Polysaccharides
  - Arabinose
  - Galactose
  - Protein
  - Uronic Acid
- **Pharmaceutical Applications**
  - Emulcifying agent
  - Thickening agent
  - Suspending agent
  - Adhesive agent
  - Glazing agent
  - Stablizing properties[14]

9.6 HENNA

Figure 7 Henna.

- **Synonym:** Henna tree, Hina, Inai
- **Biological Source:** It is obtained by the lawsonia intermission plant
- **Family:** Lythraceae
- **Chemical Constituents**
  - Lawsome
  - Coumarin
  - Xanthene
  - Flavonoids
  - Fats

- Resin
- **Pharmaceutical Applications**
- Colouring agent
- Binding agent
- Hair dye
- Cosmetics
- Sunscreen agent[8]

9.7 TURMERIC

Figure 8: Turmeric.

- **Synonym:** Indian saffron, Haldi
- **Biological Source:** It is consists of dried rhizomes of curcuma longa linn
- **Family:** Zingiberaceae
- **Chemical Constituents**
- Curcumin
- Curcuminoids
- Bis desmethoxy Curcumin
- **Pharmaceutical Applications**
- Colouring agent
- Cosmetics
- Food products[15]

9.8 ANNATTO

Figure 8: Annatto.

- **Synonym:** Achiote, Bija
- **Biological Source:** It is obtained by the seed of bisa arellana
- **Family:** Bixaceae
- **Chemical Constituents**
  - Bixin
  - Norbixin
- **Pharmaceutical Applications**
  - Colouring agent
  - Coating agent
  - Food industry[8]

9.9 INDIGO

Figure 9: Indigo.

- **Synonym:** Neel, Indigo
- **Biological Source:** It is obtained from leaves of indigo tinctoria
- **Family:** Leguminosae
- **Chemical Constituents**
  - Indigo
  - Rotenol
  - Tephrosion
  - Sumatrol
  - Glycoside indican
- **Pharmaceutical Applications**
  - Colourant
  - Food industry
  - During of Jeans[8]

9.10 SHATAVARI

Figure 10: Shatavari.

- **Synonym:** Shatmuli
- **Biological Source:** It consist of dried roots and leaves of plant asparagus racemosus
- **Family:** Liliaceaceae
- **Chemical Constituents**
  - Steroidal saponins
  - Isoflavones
  - Asparagamine
  - Polysaccharides
- **Pharmaceutical Applications**
  - Binding agent
  - Sustaining agent in tablet[16]

10. CONCLUSION

Herbal excipients are integral to the development of herbal formulations, providing multiple applications and benefits. They enhance the stability, solubility, and bioavailability of active ingredients, making herbal products more effective. Their natural origin often aligns with consumer preferences for safer and more sustainable options, contributing to better patient compliance.

Overall, the strategic application of herbal excipients not only improves product performance but also fosters trust in herbal therapies among consumers and healthcare professionals alike.

11. REFERENCE

1. Arpita Singh, Nidhi Gupta, Amresh Gupta, Review On Herbal Excipients, International Journal Of Indigenous Herbs and Drugs, 2021; 6(1): 05-08.
2. Roobal Chaudhary, Pratiksha Kumari, Stability Aspects Of Herbal Formulation, Scholar Academic Journal Of Pharmacy, 2022; 8(2): 103-110.

3. Prashant Singh, Tarique Mahmood, Arshiya Shammeem, Paramdeep Bagga, Nesar Ahmad A Review On Herbal Excipients and Their Pharmaceutical Application, Scholar Academic Journal Of Pharmacy, 2016; 5(3): 53-57.
4. Sinha V., Rachna K., Polysaccharides In Colon Specific Drug Delivery, International Journal Pharm, 2001; 224: 19-38.
5. John G., Declan M., James E., The Use Of Agar As A Novel Filter For Monolithic Matrices Produced Using Hot Melt Extrusion, Eur, J. Pharm, Biopharm, 2006; 64: 75-81.
6. Abhishek Jain, Pinky Radiya, Raju Wadekar, Saleel Limaye, Chetan Pawar, Review Article Of Natural Excipient - An Alternative To Synthetic Excipients; A Comprehensive Review, International Journal Of Pharmaceutical And Medicinal Research, 2024; 2(4): 123-127.
7. Jain NK., Dixit VK., Studies On Gums And Their Derivatives As Binding Agent, Indian Journal Pharm Sci, 1988; 50: 113-114.
8. S.Selvadurai, S. Divya, A Geetha, K.Rohini and Anbazhagan, Herbal Excipients – Significance, Of Substance Of Natural Origin As Excipients, International Journal Of Pharm Tech Research, 2020; Bol. 13(03): 243-252.
9. Girish K, Dhiren JP, Shah VD, Prajapati VC; Gums and mucilages: versatile excipients for Pharmaceutical formulations Asian J. Pharm. Sci., 2009; 4(5): 309-332.
10. Shirwaikar A, Prabu SL, Kumar GA; Herbal Excipients in novel drug delivery systems, Indian J. Pharm. Sci, 2008; 70: 415-422.
11. Jani GK, Shah DP, Jain VC, Evaluating Mucilage From Aloe Barbadensis Miller As A Pharmaceutical Excipient For Sustained Release Matrix Tablet Pharm Tech, 2007; 31: 90-98.
12. Uwah TO, Akpabio EI, Effiong DF, Plants As Pharmaceutical Excipients In Oral Sustained Drug Delivery Systems, Journal Of Applied Pharmaceutical Research / JOAAPR, 2021; 9(3): 26-38.
13. Hyndavi. M, Badatinath. AV, Nirosha. M, Formulation And Evaluation Of Sustained Release Matrix Tablet Of Using Aloe Barbadensis Mucilage, International Journal Of Pharmaceutical And Applied Science, 2017; 7(4): 36-41.
14. Ravindra B. Malabadi, Kiran P. Kolkar, Raju K. Chalannavar, Natural Plant Gum Exudates And Mucilage; Pharmaceutical Updats, 2001; 3(10): 1897-1912.
15. Sujit Gilda, Meghana Kanitkar, Ramesh Bhonde, Anant Paradkar, Activity Of Water Soluble Turmeric Extract Using Hydrophilic Excipients, LWT – Food Science And Technology, 2020; 43: 59-66.

16. Kulkarni GT, Gowthamrajan K, Rao GB, Evaluation Of Binding Properties Of Selected Natural Mucilage J. Science And Indian, 2002; 61: 529-532.