World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 5.088

METHODS OF EXTRACTION OF PHARMACEUTICAL EXCIPIENTS FROM NATURAL RESOURCES: A REVIEW

Abhishek Soni[1], Hemant Kumar Verma*[1], Ojasvi Gupta[1], Dr.Amit Chaudhary[1] and Shalini Jamwal[1]

[1]School of Pharmacy, Abhilashi University, Chail chowk, Mandi (H.P).

***Corresponding Author: Hemant Kumar Verma**
School of Pharmacy, Abhilashi University, Chail chowk, Mandi (H.P).

Article Received on 22/03/2019 **Article Revised on 12/04/2019** **Article Accepted on 02/05/2019**

ABSTRACT

Excipients are defined as 'the substance used as a medium for giving a medicament'. Pharmaceutical excipients can be defined as non-active ingredients that are mixed with therapeutically active compounds to form medicines. The ingredient which is not an active compound is regarded as an excipients. They are classified as binders, diluents, lubricants, glidants, disintegrants, polishing film formers and coatings agents, plasticizers, colouring, suspending agents preservatives, flavorings, sweeteners etc. Thus present article aims to throw light on their methods of extractions such as solvent extraction, alkaline extraction, ethanol extraction, fermentation etc. as they are important to maintain the physical and chemical nature of the excipients.

KEYWORDS: Excipients, Natural Pharmaceutical Excipients, Methods of Extractions.

INTRODUCTION

Excipients

Excipients are defined as 'the substance used as a medium for giving a medicament'.[1] The role of excipients in determining the quality of a formulation and in many cases the bioavailability of drug from tablets has received considerable attention. Binders are added to tablet formulation to impart plasticity and thus increase the interparticulate bonding strength within the tablet. The development of new excipients for potential use as binding agent in tablet formulations continues to be of interest. This is because different binding agents can be useful in achieving various tablet mechanical strength and drug release properties for different pharmaceutical purpose [2] Several pharmaceutical excipients of plant origin, like starch, agar, alginates, carrageen an, guar gum, xanthan gum, gelatin, pectin, acacia, tragacanth, and cellulose find applications in the pharmaceutical industry as binding agents, disintegrates, sustaining agents, protective's, colloids, thickening agents, gelling agents, bases in suppositories, stabilizers, and coating materials.[3]

Pharmaceutical excipients

Pharmaceutical excipients can be defined as non-active ingredients that are mixed with therapeutically active compounds to form medicines. The ingredient which is not an active compound is regarded as an excipients. 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 components for the product variability.

Classification of Excipients: Excipients are commonly classified according to their application and function in the drug products.

- Binders
- Diluents
- Lubricants, Glidants, Disintegrants
- Polishing Film formers and Coatings agents
- Plasticizers, Colouring
- Suspending agents Preservatives, Antioxidants
- Flavorings, Sweeteners, Taste improving agents
- Printing inks, Dispersing agents Gum[4]

Binders-Binders are agents employed to impart cohesiveness to the granules. This ensures the tablet remains intact after compression. The development of new excipients for potential use as binding agent in tablet formulations continues to be of interest. This is because different binding agents can be useful in achieving various tablet mechanical strength and drug release properties for different pharmaceutical purpose. Natural polysaccharides are widely used in the pharmaceutical and food industry as excipients and additives due to their low toxicity, biodegradable, availability and low cost. Natural binders like different starches, gums, mucilages dried fruits possess binding capacity as well as some other properties like disintegrant, filler, sustain release, and these natural polymers are much safer and economical than polymers like PVP. Different starches

like rice, potato, maize, corn, wheat, tapioca starch and gums like ferula gummosa boiss, gum olibanum, beilschmiedia seed gum, okro gum, aegle marmelod gum, gum cordial, okra gum and cassia roxburghii seeds gum and plant fruit like date palm fruit and orange peel pectin shows good potency as a binding agent.

Gums are widely employed in the pharmacy as thickeners, suspending agents, emulsifying agents, binders and film formers. With the increase in demand for natural gums, it has been necessary to explore the newer sources of gums to meet the industrial demands. India, due to its geographical and environmental positioning has traditionally been a good source for such products among the Asian countries.[5]

Lubricants- A lubricant, an additive to reduce friction, is an essential component of a drug formula since lubrication is often required to ensure the success of pharmaceutical manufacturing. For pharmaceutical operations such as blending, roller compaction, tablet manufacturing, and capsule-filling, lubrication is essential in order to reduce the friction between the surfaces of manufacturing equipment and that of organic solids as well as to ensure the continuation of an operation. Pharmaceutical lubricants are the agents added to tablet and capsule formulations in a very small quantity (usually 0.25%–5.0%, w/w) to improve the powder processing properties of formulations.

Disintigrants- Disintegrants are substances or mixture ofsubstances added to the drug formulations, which facilitate dispersion of tablets into smaller particles for quick dissolution when it comes in contact with water in the GIT. For example starch.

Flavouring agent- Give the tablet a more pleasant taste or to mask an unpleasant one. (Chewable tablet) Flavouring agents are often thermolabile and so cannot be added prior to an operation involving heat. They are often mixed with the granules as an alcohol solution. Eg: citric acid, glycerol, orange oil, menthol, vanillin etc.

Colorants- Uses: It is added to tablets to aid identification, improve patient compliance, mask of off color drug production of more elegant product. All coloring agents must be approved and certified by FDA. These dyes are applied as solution in the granulating agent. Example: Yellow 6- FD & C sunset yellow yellow 5- FD & C Tartrazine. It is added during coating.

Sweeteners- They are used in chewable tablet to exclude or limit the use of sugar in the tablets. Most commonly used sweetenrs: Mannitol, lactose, sucrose, Dextrose 72% as sweet as sucrose.

Antioxidants- Antioxidants are added in tablet formulation: to protect drug from undergoing oxidation. Chelators may also act as antioxidant. Most commonly used antioxidants include ascorbic acid and their esters, alpha-tocopherol, ethylene diamine, tetra acetic acid.[6]

Coating Agents- Coating is a process by which an essentially dry, outer layer of coating material is applied to the surface of a dosage form and agents used in this process are called coating agents. Three types of coating agents are used pharmaceutically. Film coating, Sugar coating and Compression coating. Function of coating agents: Protection, Masking, Elegance, Ease of swallowing, and identification.

Preservatives: Substances that commonly added to various foods and pharmaceutical products in order to prolong their shelf life. Preservative system protect the product against microbial proliferation but does not compromise product performance. Eg. Benzoic acid & its salts, Sorbic acid and its salts etc.

Fillers: Typically fill out the size of a tablet or capsule, making it practical to produce & convenient for the consumer to use Function of fillers: Add volume and/or mass to a drug subs, so facilitating precise metering & handling in preparation of dosage forms. Used in tablets and capsules. Example: Starch, Plant cellulose & Di basic calcium phosphate.[7]

MATERIAL AND METHODS OF EXTRACTIONS

Some of the natural pharmaceutical excipients are listed below with their methods of extractions-

S. No.	Name	Source	Uses	Method of extraction
1	Agar	*Gelidium amansii*	Gelling, stabilizer and thickening agent	Acidification, alkaline extraction, solid liquid separation are the major steps.[8]
2	Starch	Grains, cereals, rice, maize, wheat, potato	Diluent, disintegrant	The wet milling is the standard method of extracting pure starch from the raw material.[9]
3	Gums and muscilage	*Gum arabic*	Tablet binder, disintegrating agent	Mucilage can be extracted from plant parts by various methods like heating, solvent precipitation and microwave assisted extraction. The easiest method is solvent precipitation. [10]
4	Citric acid	Citrus fruits	Preservative, antioxidant	Solvent extraction[11]
5	Glycerol	Animal fat, vegetable oil	Lubricant	Liquid Liquid extraction process[12]

6	Orange oil	*Citrus aurantium*	Flavouring agent	Extraction of orange oil can be done by steam distillation, improved steam distillation and through chloroform extraction.[13]
7	Menthol	*Mentha piperita*	Perfuming agent, flavouring agent.	Steam distillation, super critical fluid extraction and automized techniques are used to extract Menthol from *M. pioerita* [14]
8	Lactose	Milk and dairy	Diluents in tablet, capsule, sugar coating solution	One of the method is Ethanol Extraction for Lactose from Nonfat Dry Milk.[15]
9	Sucrose	Plants	Sweetening agent,	Water extraction [16]
10	Plant Cellulose	Cell wall of the green plants	Compressibility enhancer	Alkaline extraction[17]
11	Turmeric	*Curcuma longa*	Colouring agent	Soxhlet extraction, hydrodistilation[18]
12	Acacia	*Acacia arabica*	Tablet binder, suspending agent, emulsifying agent	Maceration [19]
13	Gelatin	Tissue like bone, skin, tendon and ligaments	Thickner, binder, emulsifying agent	Acid extraction and alkali extraction.[20]
14	Mannitol	*Fraxinus ornus*	Sweetening agent	Aqueous extraction, fermentation.[21]
15	Xanthann gums	*Xanthomonas compestris*	Stabilizer, thickner, viscosity enhancer	Fermentation.[22]
16	Sandalwood oil	*Santalum album*	Perfuming agent	Microwave air-hydro distillation and Microwave hydro distillation.[23]
17	Rose oil	*Rosa gallica*	Flavouring agent	Steam distillation or solvent extraction, hydrodistilation, hexane extraction.[24]

ACKNOWLEDGEMENT

I am thankful to Mr. Abhishek Soni, Assistant Professor, School of Pharmacy, Abhilashi University, Chail Chowk, who guide and motivate me to do research work. I wish to express my deep-rooted gratefulness towards, Prof. Amit Chaudhary Dean School of Pharmacy and Ms. Shalini Jamwal for their friendly support, edifying, enlightening discussions and timely suggestions during my research work. It is truly said 'Teacher occupies the place of God, whose indebtedness is impossible to return'.

RESULT AND CONCLUSION

The use and methods of extraction of pharmaceutical excipients from natural sources was reviewed and were discussed according to their classes. Natural excipients development is gaining a lot of attention these days. Polymers play a vital role in the drug delivery. So, the selection of polymer plays an important role in drug manufacturing. Natural polymeric excipients and their modifications have continued to dominate the research efforts of scientists in finding cheap, less expensive, biodegradable, ecofriendly excipients. Some of these excipients have obvious advantages over their synthetic counterparts in some specific delivery systems due to their inherent characteristics.

REFERENCES

1. Morton's; The Nurse Dictionary. 24th ed. Faber & Faber: London, 1957.
2. The Joint IPEC – PQG Good Manufacturing Practices Guide for Pharmaceutical Excipients, 2006.
3. Wade A, Weller PJ; "Handbook of Pharmaceutical Excipients"; 11th ed; The Pharmaceutical Press: London, 1994; 426-428.
4. Dharmendra S "Review article on natural excipient", Journal of pharmaceutical and biological archives, 2012; 1028-1034.
5. Soni A, Rju l.; "A review on natural binding agent"; World of pharmacological research and technology, 2347-4882.
6. Dr. Szilard Pal; **"**Pharmaceutical Excipients of solid dosage forms"; Institute of Pharmaceutical Technology and Biopharmacy.
7. Dr. Nehal Aly Afifi; "Pharmaceutical Excipients"; Faculty of Vet. Med. Cairo University, 11/15/2016.
8. Abraham Adiam, Afewerki Berihu, " Extraction of Agar and Alginate from marine Seaweeds in Red Sea Region"; International journal of Marine Biology and research, 2018; 1-8.
9. Mohmamed K.G.: "Modified Starch and Its Potentials as Excipient in Pharmaceutical Formulations": Novel Approaches in Drug Designing & Development, 2017; 001-004.
10. Pawar Ashok Harshal; "Recently Investigated Natural Gums and Mucilages Pharmaceutical Excipients: An Overview"; Journal of Pharmaceutics, 2014; 1-9.
11. Pazouki M, Panda Tapobrata; "Recovery of citric acid- A review"; Bioprocess Engineering, 1998; 19: 435-439.

12. Contreras Ignacio, Parra Jonathan; "Modeling of Liquid Liquid Exraction Process for Glycerol Purification From Biodiesel Production"; Journal Of Chemistry And Chemical Engineering, 2014; 971-977.
13. Saidat O. Giwa, Giwa Abdulwahab; "Utilizing Orange Peels For Essential Oil Production"; Journal Of Engineering And Applied Sciences, 2018; 17-25.
14. Paul Rita, Animash K. Datta; "An updated overview on peppermint (Mentha piperita L.)";International Research Journal of Pharmacy, August 2011; 2(8): 1-10.
15. J. E. Hoff, S. S Nielsen, I. C. Peng, And J. V. Chambers; "Ethanol Extraction of Lactose from Nonfat Dry Milk: Production of Protein Raffinate"; Journal of Dairy Science, 1987; 70(9): 1785-1796.
16. Jia Fei, Zimmt Werner; "Efficient Extraction Method To Collect Sugar From Sweet Sorghum"; Journal Of Biological Engineering, 2013; 1-8.
17. Radotic Ksenija, "Method Of Extraction And Purification Of Lignin And Cellulose From Plant Tissue"; Research gate, 2016; 365-378.
18. P.K Ashok, Pagala Bangaraiah; "Extraction of Curcumin From Turmeric roots"; International Journal of Innovative Research and Studies, 2013; 2: 290-300.
19. Pareek K pawan, A S M Raja, Dinesh B Shankyawar; Extraction of babul (Acacia nilotica) bark and efficacy of natural cplour onwoolen yarn"; The indian Journal of Small Ruminats, 2015; 21(1): 92-95.
20. Seema Tharannum, Suresh Raksha; Extraction and Characterization of Gelatin from Chicken Waste for Application in Food and Pharma Industry"; International Journal of fanamental and Applied science, 2016; 5: 44-48.
21. Van Hal J.W, Huijgen Wouter J.J; "Process for Mannitol Exraction from seaweed"; Reasearch Gate, 2014; 1-14.
22. Psomas S.K, Kyriakidis D.A; "Xantan Gums Production by *Xanthomanas Campestris* w.t. Fermentation from Chestnut Extract"; Applied Biochemistry And Biotechnology, 1999; 82: 175-176.
23. H S Kusuma; M. Mahfud; "The Extraction of Essemtial oil from Sandalwood by Microwave Air-Hydrodistilation Method"; J. Mater. Environment Science, 2016; 7(5): 1597-1606.
24. Mariana Oatrascu, Marilena Radoui; "Rose Essential Oil Exreaction From Fresh Petals Using Synergetic Microwave And Ultrasound Energy: Chemical Composition And Antioxidant Activity Assessment": J.Chem. Chem. Eng, 2016; 10: 136-142.