



International Journal of Research in Pharmacy and Allied
Science (IJRPAS)

Published by Ideal Publication

Available at <https://idealpublication.in/ijrpas/>

Vegetable Capsule: A Review

Sayyed Zaid*

J.I.I.U'S Ali Allana College of Pharmacy Akkalkuwa, Dist: Nandurbar (425415) Maharashtra ,India.

Article History

Received: 03/06/2023
Revised: 15/06/2023
Accepted: 23/06/2023
Published: 01/07/2023

Corresponding Author:

Sayyed Zaid

Email ID:

onlysyed8855@gmail.com

Mobile No:

(+91) 7840907054

Abstract:

This review article has provided the details of various polymers from vegetarian sources that can act as a possible replacement for gelatin in the preparation of soft gel capsule films. These polymers can overcome the demerits associated with the gelatin like the spread of bovine spongiform encephalopathy (BSE, Mad Cow disease) and not being preferred by the people belonging to certain religious groups or those who have dietary restrictions.

Keywords: Vegetable Capsule, HPMC, Alginate .

INTRODUCTION.

Capsules can both be soft gels or hard, either manner the advantages of taking pills over capsules are evident. Here are some of the great advantages that tablets carry: quick dissolving, that means your medicine gets into your system quicker, often tasteless, easy to swallow when compared to tablets, no extra added components to keep the pill together and choice of gelatin or vegetarian capsules [1, 2].

Vegetable capsule shell is commonly prepared from the hydroxypropyl methylcellulose (HPMC), most commonly known as Hypromellose. It is produced by using synthetic modification of the naturally occurring polymer cellulose and is considered safe for ordinary intake, in human. As a coating polymer, as a bioadhesive, thickening agent in controlled release systems, in solid dispersion to enhance drug solubility, as a bioadhesive, and as a binder. The material is described as a white to slightly off white powder or granules,

practically insoluble in warm water, in acetone, in dehydrated ethanol and in chloroform, but dissolves in cold water giving a colloidal solution owing to the reversible thermal gelation property. HPMC is available in unique type of groups with limits on methoxy and hydroxypropoxy organizations. These agencies affects the various HPMC properties consisting of gelation temperature, viscosity, flexibility and hydration [3]. The word-capsule beginning from the Latin capsule, this means that a small box.

Capsules are both hard (-piece) or soft (one-piece) and are used to encapsulate pharmaceutical formulations. The two-piece capsule is made from a cap-piece that slips over one Side open body-piece forming closed cylindrical object. The most not unusual route of management of capsules is orally however drugs for inhalation such as Spiriva HandiHaler, vaginal which include Gyno- Daktarin and rectal administrations are all possible. Most of pharmaceutical drugs available in market are made from gelatin, several HPMC tablets for powdered herbs and dietary dietary supplements were to be had in recent years. The crosslinking of gelatin and drug incompatibilities and the strict regulations regarding using animal derived gelatin requiring the absence of bovine spongiform encephalopathy (BSE) have encouraged the search for gelatin replacement. Religious, cultural and personal issues may affect patients' preference towards the medications presented in capsule dosage forms. HPMC capsules is good alternative of gelatin capsules due to its vegetable source. As time goes on more companies are switching to vegetarian capsules to package their pills. It

Is easy to see why when you look at the figures. While it would appear that a majority of people who take medication in capsule form don't care what the source of the capsule is, there are still a number of people who do care. The best way to mediate the situation is to make a full switch over so that the pills are safe and natural for every one [1].

Hydroxyl Propyl Methyl Cellulose (HPMC) as Polymer for Vegetable Capsule.

Vegetable capsule shell is mostly prepared from the hydroxyl propyl methyl cellulose (HPMC), most commonly known as hypromellose. It is produced by synthetic modification of the naturally occurring polymer cellulose and is considered safe for normal consumption, in human. HPMC is used as a coating polymer, bioadhesive, thickening agent in controlled release systems, in solid dispersion to enhance drug solubility, bioadhesive, and binder. The material is described as a white to slightly off white powder or granules, practically insoluble in hot water, in acetone, in dehydrated ethanol and in chloroform, but dissolves in cold water giving a colloidal solution owing to the reversible thermal gelation property. HPMC is available in different type of groups with limits on methoxy and hydroxyl propoxy groups [1].

These groups affect many of the HPMC properties such as gelation temperature, viscosity, flexibility and hydration. Vegicaps soft capsules are alternative animal free capsules. The shell is made from seaweed extract and gluten free starch and contains no modified sugars and artificial colours. Advantages of it is that it is free of all animal derivates-no pork or beef content, easy to swallow, soft, natural, perception of a healthier product and low shell odour

Hydroxy propyl cellulose (HPC) is a derivative of cellulose with both water solubility and organic solubility. It is used as an excipient, and topical ophthalmic protectant and lubricant. Other names are Cellulose, 2-hydroxypropylether; oxypropylated cellulose; E463; Hyprollose.

Manufacturing procedure of HPMC vegetarian capsule: the manufacturing of HPMC based capsules requires some modification to the moulding machine or to the formulation of the shell materials. HPMC gelling from solution occurs when the temperature is increased whilst it is transformed to its original solution as the temperature is decreased, unlike gelatine solution. It means that the pins immersed in the dip pan containing the HPMC solution must be of higher temperature (70°C) in order for the film to be formed. The pins, the temperature of the pins must be further maintained post-dip to facilitate gelation until the films dry out in the kilns. Because HPMC shell walls are much weaker than gelatin made shells, removal of the capsule from the pins and subsequent handling and filling are difficult. To overcome these problems, three approaches were adapted. These approaches were to use a stripper jaw with depressions on the internal surface, increase the formed HPMC film thickness and the use of gelling agents. . The following gelling agents were experimented: tamarind seed polysaccharide, carrageenan, pectin, curdlan, gallant gum and furcellaran. Shionogi Qualicaps Co. (Japan) was able to produce HPMCCarr capsule the usage of the standard machinery for the hard gelatin capsule by means of the usage of HPMC gelling system containing carrageenan as a gelling aid (kappa- and iota- carrageenans are preferred) and potassium chloride as gelation promoter. The company has a Quali-V registered trademark. European patent EP0592130 claims that HPMC with higher whiteness, lower equilibrium moisture content material and better film properties and compatibility with drugs could be produced by exposing the materials to ultraviolet light within the wavelength range of at least 200 nm¹⁴. The claim indicates that at the wavelength 253.7 nm, the preferred conditions for ultraviolet radiation are a spacing of about 10 cm for approximately 10 hours. An invention of Warner-Lambert company (now with Capsugel that later became part of Pfizer) have documented the preparation of HPMC capsules with hydrocolloids such as gellan gum (HPMCGell) and sequestering agents (such as ethylenediaminetetraacetic acid, sodium citrate, citric acid and their combinations 5% of the capsule shell substances comprised of approximately equal proportions of both the hydrocolloid and the sequestering agent. The claim shows that these capsules would have films that are less brittle (unlike those produced with carrageenans), no poor disintegration in vivo and the film transparency is retained [4,5] .

Starch as Polymer for Vegetable Capsule.

Starch is the polysaccharide strength storage material of the plant kingdom. It includes amylose that is linear $\alpha - (1 \rightarrow 4)$ glucan and amylopectin that is an enormously branched, high molecular weight glucan. Amylopectin has $\alpha - (1 \rightarrow 4)$ glycosidic linkages containing $\alpha - (1 \rightarrow 6)$ department points [11-13]. Gelatin is the unique and maximum common material used to provide capsules. It far the much less expensive choice, and is to be had in lots of alternatives. These capsules can be purchased in various shades, flavors, as

well as sizes to suit your needs. But, gelatin is an animal via product formed from collagen. This protein is received from connective tissues as well as organs of animals, which can be a major downfall for a few consumers. Individuals with non-secular or dietary restrictions which forbid them from eating such animal products will not be perfect for the usage of the conventional gelatin capsules. Any other component to consider when choosing among gelatin and vegetarian tablets is what they are going to be filled with. Gelatin capsules are simplest suitable to be used with powdered medicinal drugs or dietary supplements. Liquids and diverse other substances which include gels are not compatible with capsules manufactured from gelatin. One of the maximum obvious benefits of using cellulose based or vegetarian tablets is that they are no longer made with animal via products. This distinct feature permits them to be appropriate for those who select not to eat products sourced from animals. Vegetarian capsules in addition to being both the obvious preference for each vegetarian and vegan customers also are more suitable for religious motives as well. In fact, vegetarian capsules are frequently deemed suitable to be categorized as each Kosher and Halal products. The non-animal origin of HPMC capsules ensures complete compatibility with Halal and Kosher certifications and in comparison to gelatin the uncooked cloth gives many technological advantages. Due to its low moisture content which stages from 4 to 6%, the HPMC is a perfect desire for moisture-sensitive drugs. Even after storage below harsh situation the drugs may not retain improved moisture ranges. Unlike gelatin, HPMC would not have a tendency to form cross-connected bonds which effects in high stability and properly-described dissolution profiles . [3]

Alginate as Polymer for Vegetable Capsule.

Its miles a non-poisonous, biodegradable, naturally occurring polysaccharide obtained from marine brown algae, certain species of microorganism. Sodium alginate is a sodium salt of alginic acid a natural polysaccharide and a linear polymer composed of one, 4-connected β -D Mannuronic acid (M) and α -D-glucouronic acid (G) residues in various proportions and arrangements 2.Sodium alginate is soluble in water and forms a reticulated shape which can be cross-linked with divalent or polyvalent cations to form insoluble meshwork. Calcium and zinc cations have been reported for cross-linking of acid groups of alginate. Alginic acid is insoluble in water therefore sodium alginate is used [4]

Carboxymethylcellulose as Polymer for Vegetable Capsule.

Cellulose is a plant product. On carboxymethylation of cellulose it forms carboxymethylcellulose. Carboxylic organization of CMC interacts with multivalent cation metal ions to form ionotropic gel that is stabilized through electrostatic interaction. Interaction between the metal group and $-OH$ group of the polymer produces good stability. It is used as a stabilizer in various pharmaceutical preparations. It is nonpoisonous [4]

Pectin as Polymer for Vegetable Capsule.

It is nontoxic, inexpensive. Polysaccharide extracted from orange peel or apple pomaces. It is used as food additives, thickening agent and gelling agent. It is a polymer of D-glucuronic acid with 1-4 linkages. Within the presence of calcium ions it forms gel [4]

Conclusion.

The well-known capsule manufacturer are thinking that now a day vegetable capsules give tough competition to gelatin capsules in market but it required some modification or improvement. These published literatures are from scientists affiliated for their own premises and companies and so there may have overemphasized the potential of HPMC capsules over gelatin one. Two important areas where improvements have to be achieved in order to qualify the HPMC capsules ahead of gelatin capsules are in their machineability and in the *in vitro* and *in vivo* disintegration/dissolution performances. The main area where HPMC capsules can have better prospect compared to gelatin capsules. This review article has provided the details of various polymers from vegetarian sources that can act as a possible replacement for gelatin in the preparation of soft gel capsule films. These polymers can overcome the demerits associated with the gelatin like the spread of bovine spongiform encephalopathy (BSE, Mad Cow disease) and not being preferred by the people belonging to certain religious groups or those who have dietary restrictions.

REFERENCE

1. Simanchal Panda, Pratit Kanchana Sahu, Sruti Ranjan Mishra Jeypore College of Pharmacy, Jeypore – 764002, Koraput, Odisha, India. Journal of Pharmaceutical Advanced Research (An International Multidisciplinary Peer Review Open Access monthly Journal) J Pharm Adv Res, 2018; 1(1): 33-37.
2. Sheladiya Dipak V, Sodha Hiten, Ketan Shah and Tusharbindu Desai School of Pharmacy, RK University, Kasturbadham, Rajkot, Gujarat, India. INTERNATIONAL JOURNAL OF PHARMACEUTICAL AND CHEMICAL SCIENCES ISSN: 2277- 5005.
3. Rakesh Hota, Simanchal Panda, Dr. Sruti Ranjan Mishra A REVIEW ON VEGETARIAN CAPSULES World Journal of Pharmaceutical Research.
4. Safwan Moulvi, Dr. Yogesh Thorat, Aishwarya Kamble, Vinod Matole, Akhil Patil. A REVIEW: MANUFACTURING OF CAPSULE SHELL FROM NATURAL SOURCES 2021 IJCRT | Volume 9, Issue 7 July 2021 | ISSN: 2320-2882
5. Chavarría-Rojas Marianela, Acuña-Amador Daniel, Madrigal-Redondo German - Gelatin and non-gelatin soft gel capsules Journal© IPEC-Americas J. Excipients and Food Chem. 12 (2) 2021