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The Disintegration of Capsule Shells Derived from Pharmaceutical Gelatin's Plant Analogs

Elena Ulrikh*, Stanislav Suhih, Lubov Dishluk, Alexander Avstrievskikh

State Educational Institution of Higher Education, "Kemerovo Technological Institute of Food Industry", 47 Boulevard Builders, 650056 Kemerovo, Russia

Abstract

This article studies the disintegration of capsule shells derived from plant analogs of pharmaceutical gelatin in buffer solutions with different indices of pH, and in the gastric and intestinal juices. The photos taken during analysis are presented. It was determined that the fastest dissolution of capsule shells from plant analogs of pharmaceutical gelatin occurs in gastric and intestinal juices. It was also found that in each solution's variants, the capsule shells had swollen. But in the case of gastric juice, the capsule shells were destroyed; the contents got out and made a slick on the surface of the solution. The highest degree of destruction was observed in gastric juice. These findings prove appropriateness of using the plant analogs of pharmaceutical gelatin for making soft capsules' shells, which are used in dietary supplements. These shells are readily soluble and digestible in stomach. It was also proved that during the destruction of shells derived from plant analogs of pharmaceutical gelatin, the shells acidify the solution.

Keywords

Capsule shells; Gelatin; Capsule destruction

Introduction

Softand elastic capsule shells made of liquid analog of pharmaceutical gelatin and plasticized by polyatomic alcohol, or other plasticizers, have been successfully used perorally and as suppositories [1]. Capsules have a soft, roundish, gelatinous shell and are filled with a liquid, paste, or powder. It is possible to prepare the capsules in different shapes; for example, capsules produced by industrial methods have a round, oval, tubular, oblong shape, or a shape of suppository. Companies generally produce capsules with a seam on the lengthy axis [2]. In the dosage forms for peroral introduction, this seam is obtained by heat sealing so that it acts as a capsule base opening and opens in the stomach quickly, that is, in less than 5 min. Suppositories generally are made in such way that this seam opens in the presence of moisture usually situated in the body's cavities. This way of pharmaceutical substances' delivery and production technology has been properly described and is available from scientific and commercial channels [3].

It is possible to produce capsules of any shape. Capsules can have an oval, square, rectangular, dumbbell, or polygonal shape, such as octagons, hexagons, or pentagons [4,5].

The important concern is the shell destruction of plant analogs of pharmaceutical gelatin analogs in different environments.

Materials and Methods

Capsule shells of pharmaceutical gelatin's plant analogs and with different composition were chosen as the subject of research.

In the current article, the destruction of soft capsule shells covering vitamin E and liquid paraffin and derived from pharmaceutical gelatin's plant analogs in different environments was studied [6,7].

Phosphate buffer was prepared as per GOST 13781-2011; pH was 7.4. And it was sterilized in autoclave at 1 atm for 20 min. After sterilization, 0.3 g/l of pepsin was dissolved in small quantity of water and filtered through the microbiological filter Milipor [8,9].

Solution simulated gastric juice—Phosphate buffer was prepared as per GOST 13781-2011; pH was 7.4. And it was sterilized in autoclave at 1 atm for 20 min. After sterilization, 1 g/l of pancreatine was dissolved

in small quantity of water and filtered through the microbiological filter Milipor.

To all solutions, 1 g/l of sodium azide was added for prevention of bacteria biodegradation [10,11].

Results and Discussion

Physicomechanical factors

From these tabulations, it was concluded that the shells from pharmaceutical gelatin's plant analogs in gastric and intestinal juices dissolve the most quickly. These findings prove appropriateness of using the plant analogs of pharmaceutical gelatin for making soft capsules' shells, which are used in dietary supplements. These shells are readily soluble and digestible in stomach.

Changing of pH solutions where had been studying the crushing of covers and capsules present on Table 2.

From these tabulations, it was concluded that during the destruction of capsular shells from pharmaceutical gelatin's plant analogs, the solution gets acidized.

All capsules were filled with useful agent. The term "useful agent" means any substance or material which influences the organism if used that as intended. For example, according to this definition, pharmaceutical substance is a useful agent. Provided that, there are many different matters, except pharmaceutical substance, which have an objective or subjective useful influence upon user and also enter to this definition. For example, anthracites and antigaseous agents have a useful influence for the treatment of gastrointestinal symptoms. Breath fresheners also have a useful objective or subjective influence upon a

*Corresponding author: Ulrikh E, State Educational Institution of Higher Education, "Kemerovo Technological Institute of Food Industry", 47 Boulevard Builders, 650056 Kemerovo, Russia

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Sample	Time of sample's degradation, h				
	Buffer, pH 7.4	Saline, pH 7.4	Gastric juice, pH 2	Intestinal juice, pH 7.4	
Cover 1	_	_	34 precipitate	34	
Cover 2	230 precipitate	36 precipitate	35 precipitate	13 precipitate	
Cover 3	_	_	35	38	
Capsule with vitamin E	7	6	3	7	
Capsule with liquid paraffin	34	35	6	8	

⁻ Samples not dissolved within 10 days.

Table 1: Shell destruction of products of pharmaceutical gelatin's plant analogs in biological environments

	Buffer, pH 7.4	Saline, pH 7.4	Gastric juice, pH 2	Intestinal juice, pH 7.4	
Cover 1	6.19	6.68	4.11	7.19	
Cover 2	6.13	6.52	3.60	7.15	
Cover 3	6.22	7.13	3.35	7.16	
Capsule with vitamin E	Measurements were not realized, since, after degradation of capsules, a film of oil and Vaseline formed on the solutions' surface.				
Capsule with liquid paraffin					

Table 2: pH of solutions after 10 days of destruction of capsule shells

lot of people. Nutritious agents, such as vitamins, minerals, and amino acids, are also useful for people who need them as supplements for their health. Flavoring and sweetening substances have subjective benefit, and are also source of energy and exemplify the definition. These are just a few examples that exemplify the definition of useful agent. Experts in the field will be able to discern such substances. It is possible to use them as liposolubles, as water-soluble pharmaceutical substances.

Pharmaceutical substances for the treatment of cough, cold, and allergic symptoms attract the most interest. These pharmaceutical substances include antihistaminic agents; antiphlogistic, anesthetic, and antipyretic agents; antiedemic nasal agents; expectorant agents; and sedative agents. The most preferable are phenylpropanolamine hydrochloride, caramiphen edisylate, acetaminophen, aspirin, other nonsteroid anti-inflammatory pharmaceutical agents, pseudoephrin hydrochloride, dextromethorphan hydrobromide, and chlorpheniramine maleate.

In our study, useful agents were liposoluble vitamin E and liquid paraffin.

It is also necessary to take into account the strength of useful agent and its ability to produce any pharmaceutical forms, not only for given mounts. There is not only recipe of produce's preparing, which did not subjected to chemical degradation.

An alternative option is the filling of firm gelatinous capsules by granules and covering them by the soft pharmaceutical gelatin's plant analogs that form a soft membrane. If this is realized, the outer cover will make the firm gelatinous capsule more resistant to damage or adulteration.

Conclusion

Physicomechanical factors of destruction of capsule shells from pharmaceutical gelatin's plant analogs were studied. It was found that in the variants of some solutions, the capsule shells had swollen, whereas in the case of gastric juice, the capsule shells were destroyed, and the contents got out and made a slick on the surface of the solution.

The highest degree of destruction was observed in gastric juice. It was also proved that during the destruction of capsule shells derived from pharmaceutical gelatin's plant analogs, the solution got acidified.

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