

USE OF ALTERNATIVE ENTERIC COATED CAPSULE WHICH IS USED IN ORAL TYPHOID VACCINE⁺

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Abstract:

The manufacture of enteric coated capsule which is used in oral typhoid vaccine obtained from local market and available materials is easy and simple. The main material in this capsule is indigested in stomach and resistant to the acidity of stomach. It dissolve in the small intestine and release its contents because it is gelatin . This material is agar and the mammals don't have the enzymes which digest it. This encourages using it as container to carry the attenuated typhoid vaccine and take it to the epithelial cells of intestine and stimulate the local immunity system to release the antibodies IgAs against typhoid .This alternative capsule doesn't contain any toxic material. The agar is a product from the alga which is used in different countries as a food flavour.

المستخلص

تم تصنيع بديل للكبسولة المعوية المغطاة والمستخدم في لقاح التيفوئيد الفموي من مواد يسهل الحصول عليها من السوق المحلية وبطريقة بسيطة . المادة الاساسية في هذه الكبسولة لا تهضم في المعدة ومقاومة للحموضتها . لكنها تذوب في الامعاء الدقيقة ، وتحرر محتواها فيها بسبب قوامها الجلاتيني . وهذه المادة هي الاكار اذ ان اللبائن لا تمتلك الانزيمات الهاضمة لها . مما شجع على استخدامها كحاوية لنقل لقاح التيفوئيد الفموي المضعف وايصاله الى الخلايا الطلائية الموجودة في الامعاء لتحفيز جهاز المناعة الموضعي، و تحرير الاجسام المضادة للتيفوئيد . هذه الكبسولة البديلة لا تحوي اي مواد سامة . اذ ان الاكار ينتج من الطحالب التي تستعمل في مختلف البلدان كمطيبات للاغذية .

Introduction:

Several systems are currently being investigated as potential means for targeting of drugs to colon. Some of these polymers which are used in coated capsule can be dissolved at pH of the colon, most of enteric polymers dissolve in the terminal ileum or at ileocaecal junction. To target the drugs specifically to colon, it is to be coated with either hydrophilic or hydrophobic polymer along with enteric polymer [1].

Many trials used typhoid vaccine *Salmonella typhi* Ty21a in enteric- coated capsules with a hydroxpropyl-methyl-cellulose-phthalate. These capsules are resistant to acidity of stomach and mammals don't digest the cellulose, stay in the stomach about two hours (2). On the other hand, the scientists used the previous capsules with (0.4M) Sodium Carbonate to ensure the neutralization of gastric acid [3].

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Another trial used the same capsules with the powdered milk and sugar solution and disodium phosphate, monophosphate and sucrose, to protect the live bacteria in the vaccine from the gastric acidity [4].

The aim of this research is to find an alternative to hydroxpropyl-methyl-cellulose-phthalate because it is expensive and it is difficult to get .

Materials & Methods:

1-The capsule contains:

- Agar-Agar 4 gm
- NaHco₃ 1 gm
- Powdered milk 0.4 gm

It is dissolved in 100 ml of distilled water and put in water bath at 60°C and left to cool to 50°C and put in special template to take the shape.

2-Preparing the artificial intestinal fluid:

The artificial intestinal fluid is (0.1) M of HCL on pH<6[2]. These conditions are used in hydroxpropyl-methyl-cellulose-phthalate [5].

Many capsules were put in (pH=4,4.5,5,5.5,6) of (0.1) M of HCL water bath.

3-Feeding to the Mice:

The capsules were fed to eight laboratory mice after 12 hours starvation by disposable syringe in (2-3) capsules and dissected after [3,6,12,18](Unpublished data).

Results & Discussion :

The various strategies for targeting orally administered drugs to the colon include covalent linkage of a drug with a carrier, coating with pH-sensitive polymers, formulation of timed released systems, exploitation of carriers that are degraded specifically by colony bacteria, bio-adhesive systems and osmotic controlled drug delivery systems.

One of these strategies adopted in this research uses the main materials agar-agar which is gelatin and this material is not toxic and is produced from alga [6]. This encourages making capsules Fig (1) which don't dissolve in the small intestine because the mammals don't have the enzymes to digest agar and this is similar to the hydroxpropyl-methyl-cellulose-phthalate [2] however, the agar is available in local market and the method of manufacture is simple, these capsules may be better tolerated than the tablets because it lacks the buffer component thought to be responsible for diarrhea and other gastrointestinal side effects[7].



Fig (1) The capsules

The capsules were put in 0.1 M of artificial intestinal fluid in pH <6 (4 , 4.5 , 5 , 5.5 , 6) in water bath with gentle movement and watched. It was found that the pH 4.5 dissolved the capsules after (2-3) hours, this is in agreement with Kim *et al.* [5].

The capsules were fed to mice and watched for features of poisoning . When they were dissected no changes in the tissues were found compared with control mice (Figure 2). For further studies organs were taken and preserved in formaline for histobiochemical studies (unpublished data), other aim is use fish oil in these capsules (unpublished data) because it is supplementary (which contains Omega-3 fatty acids) in conditions of Alzheimer disease to Zellweger syndrome are based on indirect evidence[8]



Fig (2) The fed Mice

a-Capsules (3 capsules and dissected after 3 hours).
b-Control.

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