HALAL BIOENCAPSULE FOR TARGETED BIFIDOBACTERIA DELIVERY

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ABSTRACT

The present study describes bioencapsulated beads for bifidobacteria delivery in a mammal (preferably human or animal), where the bead includes *Bifidobacterium pseudocatenulatum* G4 and encapsulation matrix. The encapsulation matrix includes gelatin, genipin and sodium alginate. The encapsulation matrix showed good entrapping properties for the bacterium tested.

INTRODUCTION

Probiotics are microorganisms which when consumed in adequate amounts has health benefits. Probiotics are considered to be viable microbial preparations which promote mammalian health by preserving the natural microflora in the intestine. Probiotics is thought to attach to the intestinal mucosa, colonize the intestinal tract and thereby prevent attachment of harmful microorganisms thereon. The probiotics action resides in that they have to reach the gut's mucosa in a proper and viable form and especially do not get destroyed by the low pH in the stomach. The use of biopolymer for the bioencapsulation of probiotic has been rapidly developed. This rapid development has occurred for the following reasons: 1) to protect the bacterial cells from damage caused by external environment, 2) guarantee their improved survival during gastro-duodenal transit, and 3) enhance their stability profile. Therefore, this study is aimed at developing halal bioencapsule for delivering bifidobacteria into the large intestine of human as well as animal.

MATERIALS AND METHODS

Gelatin, genipin and sodium alginate were used to prepare the encapsulating matrix. *Bifidobacterium pseudocatenulatum* G4 was used as the model bacterium. The strength and stability of the bioencapsule in the simulated GIT conditions were measured using texture analyzer and electron microscopy. The survivability/encapsulation yield of the bacterium tested was measured using plate count method.

RESULTS AND DISCUSSION

Table 1 shows the bead strength (hardness in g) before and after exposure to simulated gastric fluid (SGF) for 3h and simulated intestinal fluid (SIF) for 2h and *Bifidobacterium pseudocatenulatum* G4 encapsulation yield (%) using different formulations of bioencapsulation matrix.

Sodium alginate (% w/v)	Hardness			Encapsulation yield (%)
	Before exposure	After exposure to SGF	After exposure to SIF	
1	313.89	525.11	154.21	45.06 ± 1.83[a]
2	848.62	1031.09	520.92	45.72 ± 0.87[a]
3	3118.66	5912.28	484.75	54.25 ± 3.54[b]
4	3748.18	5575.34	627.83	57.53 ± 2.50[b]
5	4299.80	7214.19	749.25	57.66 ± 2.68[b]

Table 1. Bioencapsule strength/hardness after exposure to simulated GIT conditions. Gelatin and genipin concentrations used were fixed at 13% and 50 mM, respectively.

The comparison of *Bifidobacterium pseudocatenulatum* G4 encapsulation yields (%) between bovine gelatin-genipin-alginate and porcine gelatin gelatin-genipin-alginate beads (using composition suggested by Annan *et al*., 2008) showed no significant difference.

CONCLUSION

The halal bioencapsule developed in this study offers promising vehicle for the delivery of bifidobacteria into the targeted site which is the colon.

REFERENCES

1. Annan NT, Borza AD Hansen TL. (2008). Encapsulation of alginate-coated gelatin microspheres improves survival of the probiotic *Bifidobacterium adolescentis* I5703T during exposure to simulated gastro-intestinal conditions. *Food Research International*. **41**: 184-193.