Regular article

日本食品化学学会誌、Vol. 25(2), 70-76(2018)
Japanese Journal of Food Chemistry and Safety (JJFCS)

# Fundamental physiochemical properties of dietary fibers used in enteral nutrition formula

(Received January 5, 2018)
(Accepted May 1, 2018)

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## Abstract

Although enteral nutrition has become more widely used in nutritional therapy, there are complications associated with nutritional support through tube feeding, including diarrhea, gastroesophageal reflux, and vomiting. To prevent these complications, some dietary fibers have been added to enteral nutrition formulas. In this study, we verified the fundamental physiochemical properties of the dietary fibers used in enteral nutrition formulas. We found that sodium alginate (SA) had the highest viscosity and the longest drying time, while had more water holding capacity than other dietary fibers, including resistant maltodextrin, partially hydrolyzed guar gum, soy dietary fiber, and low methyl ester pectin (LMP). LMP and SA was solidified by artificial gastric juice. These results suggest that SA in enteral nutrition formulas is solidified in the stomach. Therefore, its use may reduce the risk of gastroesophageal reflux and vomiting. SA was less fermented, indicating that it has a high molecular weight in the colon, thereby maintaining its viscosity and water-holding capacity, and thus contributing to maintaining fecal volume.

Keywords : dietary fibers, enteral nutrition formula, physiochemical properties

## I Introduction

Enteral nutrition is the first choice of nutrition therapy for patients without gastrointestinal tract impairment [1)]. Enteral access is a way to supply a nutrition formula through feeding tubes such as nasogastric tubes, percutaneous endoscopic gastrostomy (PEG) feeding tubes, and jejunostomy feeding tubes. It is used for patients whose oral nutrient intake is insufficient to meet their estimated needs. Although it has become more widely used, there are complications associated with nutritional support through tube feeding, including diarrhea, gastroesophageal reflux (GER), and vomiting [2-5)]. These problems reduce patient quality of life.

Dietary fiber has been reported to help minimize diarrhea in patients receiving enteral nutrition, particularly in non-critically ill patients [6)]. Thus, dietary fibers such as resistant maltodextrin (RMD) and partially hydrolyzed guar gum (PHGG) are popularly used in clinical nutrition. In particular, PHGG was added to nutrition formulas globally to prevent diarrhea [7)]. Most nutrition formulas are liquids and have low viscosity, which may be responsible for the occurrence of GER. Since GER is a serious complication, its occurrence in patients receiving liquid nutrition formula makes the continuation of enteral nutrition difficult. To address this problem, semi-solid enteral nutrition formulas were developed. These nutrition formulas [8, 9)] are highly viscous and contain insoluble dietary fibers such as soy dietary fiber (SDF). Due to their high viscosity, semi-solid enteral nutrition formulas are typically administered through a large-diameter PEG feeding tube. Recently, a new type of nutrition formula has been administered to clinical patients. This formula is in a liquid state when administered through a nasogastric tube and transforms to a semi-solid state in the stomach prior to reverting to the liquid state within the intestines [10, 11)].

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