



Inhibitory effect and mechanism of acarbose combined with gymnemic acid on maltose absorption in rat intestine

Hong Luo, Le-Feng Wang, Toshiaki Imoto, Yasutaka Hiji

Hong Luo, Toshiaki Imoto, Yasutaka Hiji, Department of Physiology, Faculty of Medicine, Torrori University, Yonago 683-0826, Japan

Le-Feng Wang, Department of Internal Medicine, Faculty of Medicine, Torrori University, Yonago 683-0826, Japan

Author contributions: All authors contributed equally to the work.

Supported by Grant for Promotion of Science from Tottori Bioscience Foundation (1997-1998), Japan and Japanese Government (Ministry of Education, Science and Culture of Japan MONBUSHO) scholarship No. 933241 (1994-1999), Japan in part. Dr. Luo was supported by the scholarships.

Correspondence to: Dr. Hong Luo, Department of Physiology, the Institute of Basic Medicine, Medical Science, 5 Dongdangantiao, Beijing 100005, China
Telephone: +86-10-65296463
Fax: +86-10-65133604

Received: May 6, 2000
Revised: June 19, 2000
Accepted: July 26, 2000
Published online: September 15, 2000

Abstract

AIM: The control of diet regimen and nutrient intake, aiming to avoid the exaggerated levels of glucose and anabolic hormone is broadly accepted as basic treatment of diabetes mellitus. Maltose is an important hydrolysate of starch, main source of nutrition. Acarbose is an alpha-D-glucosidase inhibitor but with a short inhibitory duration. Gymnemic acid (GA), a group of triterpene glucuronides, inhibits glucose absorption with a longer effective duration but it needs a longer time to achieve its maximum effect. To determine whether nutrient control in diabetic care can be improved by combination of them, we compared the combinative and individual effect of acarbose

and GA on maltose absorption and hydrolysis in small intestine.

METHODS: The absorption and hydrolysis of maltose were studied by re-cyclic perfusion of intestinal loops *in situ* and motility of the intestine was recorded with the intestinal loop *in vitro*, of Wistar rat.

RESULTS: The total inhibitory rate of maltose absorption was improved by the combination of GA (0.1-1.0 mg/mL) and acarbose (0.1-2.0 mmol/L) throughout their effective duration ($P < 0.05$, *U* test of Mann-Whitney), although the improvement only could be seen in the low dosages during the first hour. With the combination, inhibitory duration of acarbose on maltose absorption was prolonged to 3 h and the onset of GA inhibitory effect was fastened to 15 min. GA suppressed the intestinal motility with a good correlation ($r = 0.98$) to the inhibitory effect of GA on maltose absorption and the inhibitory effect of 2 mmol/L (higher dose) acarbose on maltose hydrolysis was dual modulated by 1 mg/mL GA *in vivo* indicating that the combined effects involved the functional alteration of intestinal barriers.

CONCLUSION: There are augmented effects of acarbose and GA, which involve pre-cellular and paracellular barriers. Furthermore, diabetic care can be improved by employing this combination.

Key words: Diabetes mellitus; Maltose, gymnemic acid; Alpha-glucosidases; Intestinal mucosa; Nutrition

© The Author(s) 2000. Published by Baishideng Publishing Group Inc. All rights reserved.

Luo H, Wang LF, Imoto T, Hiji Y. Inhibitory effect and mechanism of acarbose combined with gymnemic acid on maltose absorption in rat intestine. *World J Gastroenterol* 2000; 6(Suppl3): 144 Available from: URL: <http://www.wjgnet.com/1007-9327/full/v6/iSuppl3/144.htm> DOI: <http://dx.doi.org/10.3748/wjg.v6.iSuppl3.144>

E- Editor: Zhang FF



Published by **Baishideng Publishing Group Inc**

8226 Regency Drive, Pleasanton, CA 94588, USA

Telephone: +1-925-223-8242

Fax: +1-925-223-8243

E-mail: bpgoffice@wjgnet.com

Help Desk: <http://www.wjgnet.com/esps/helpdesk.aspx>

<http://www.wjgnet.com>

