INTRODUCTION

The immune function is vitally important for prevention and control of infectious diseases. We are interested especially in the immunoglobulin production-stimulating factor in foodstuffs, which contributes to development of functional food. Arrowroot (Maranta arundinacea L.) is a locally grown crop in Indonesia. Arrowroot tuber contains plenty of starch and other compounds. However, the immunostimulation effect of polysaccharides from arrowroot is not fully understood. Simple molecules such as mono-, di- and oligosaccharides derived from complex carbohydrates during digestion, may exert these biological effects. The complex carbohydrates exert an effect on gut-associated immunity before absorption, which is then transferred to the systemic immune responses via MLNs lymphocytes.

MATERIALS AND METHODS

1. Preparation of arrowroot starch extract

Arrowroot starch from Sukoharjo Indonesia was solubilized in water by heating at 121°C for 20 min and was centrifuged to remove insoluble substances.

2. Cells and cell culture

- Cells: Human-human hybridoma cell line (HB4C5)
- Balb/C mice splenocytes
- Medium: ITES (insulin, transferrin, selenium, ethanoamine, solenite)-ERDF

3. In vivo assay

Female 6-week-old BALB/c mice were orally administrated with ASE for 14 consecutive days. Then, the mice were sacrificed and MLNs lymphocytes were collected for ex vivo assay.

RESULTS AND DISCUSSION

1. Effect of arrowroot starch on IgG1 production of HB4C5 cells

The result indicated that the arrowroot starch stimulated IgM production of HB4C5 cells in a dose-dependent manner against control. Heating process solubilized the active substance in the arrowroot starch. These facts suggest that the active substance in the arrowroot starch is solubilized by heat treatment. It also indicated that arrowroot starch consisted of heat resistant substances that enhanced IgM production.

2. Effect of arrowroot starch on Ig and INF-γ production of mice splenocytes in vitro

The arrowroot starch extract stimulated IgG, IgM and IgA production by mice splenocytes around 4-, 7- and 2-fold, respectively. The arrowroot starch strongly enhanced interferon-γ production of splenocytes treated with 10 μg/ml of concanavalin A.

3. Effect of arrowroot starch on Ig production of mice MLNs

Oral administration of ASE activated IgM, IgG, and IgA productions by MLNs lymphocytes. The productions of IgG and IgM by MLNs lymphocytes increased 2.6- and 1.8-fold, respectively. On the other hand, IgA production was enhanced slightly. It can be concluded from these results that ASE contains the Ig production stimulating-factor, and may possess the possibility to improve the immune system.

CONCLUSION

- Arrowroot starch extract contains the Ig production stimulating factor.
- Arrowroot starch extract dissolved in water at 121°C enhanced IgM production of HB4C5 cells.
- Arrowroot starch extract obviously accelerated Ig and IFN-γ production of mice splenocytes in vitro.
- Arrowroot starch extract enhanced IgM, IgG, and IgA production of mice MLNs lymphocytes.