# Effect of Coffee Drink Containing Mannooligosaccharides on Total Amount of Excreted Fat in Healthy Adults

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**A liquid coffee drink containing mannooligosaccharides from coffee mannan (MOS) was administered to a group of healthy adults. Subsequently, the amount of fat excreted from the body was examined. The subjects were divided into two groups: One was administered a liquid coffee drink containing MOS 3.0 g/day whereas the other was administered a placebo drink for seven days. Both groups were fed the standardized meals during the experiment. In the amount of average excreted fat, the drink containing MOS intake showed a significant increase in comparison with the before intake group and placebo intake group ($p < 0.05$ and $p < 0.001$, respectively). In addition, fat utilization in MOS intake group was significantly lower than the before intake group and the placebo group ($p < 0.05$ and $p < 0.001$, respectively). These results suggested that the intake of MOS 3.0 g/day increased in the amount of excreted fat and decreased in fat utilization.**

**Key words** —— coffee, mannooligosaccharide, excreted fat, fat utilization

## INTRODUCTION

Intensive studies are underway with regard to mannooligosaccharides from coffee mannan (MOS) in an effort to reveal new functionality including the lowering of the body fat level. In somewhat obese adults, a liquid coffee drink containing MOS 3.0 g/day intake reduced the areas of subcutaneous and visceral fat.[1,2] Attempting to study this mechanism, we focused on the increase in the amount of fat excreted from the body. The rats given the food containing MOS had a higher amount of fecal fat as compared to their counterparts given a regular diet.[3] The preceding experiment by the authors reported that MOS 1.0 g/day intake was increased the concentration of excreted fat in healthy adults.[4] This result suggested that MOS intake was not only increasing the amount of total excreted fat but also inhibiting fat utilization in body. However, in order to investigate these, more accurately the clinical testing under controlled diet is required.

In this study, the coffee drink containing MOS 3.0 g/day was administered to the subjects whose fecal sample was analyzed relative to the amount of fat. Furthermore, the fat utilization was examined by giving the standardized meals to all of the subjects throughout the experiment, thus standardizing the fat intake from food.

## MATERIALS AND METHODS

**Preparation of MOS and Placebo Drinks** —— Test drinks as well as MOS were prepared according to the methods of Asano *et al*.[2] The amount of MOS in the test drink was 1.0 g/100 ml. The composition of the placebo drink was identical to that of the test drink except that MOS was replaced by corn syrup solid.

**Screening of Subjects** —— This experiment was performed after obtaining approval from "The Board of Evaluation for Research Studies involving Human Subjects," New Drug Development Research Center, Inc. In addition, this experiment was conducted in compliance with the spirit of the "Declaration of Helsinki" and with the informed written consent of the subjects overseen by qualified clinical trial physicians. A total of twenty healthy male

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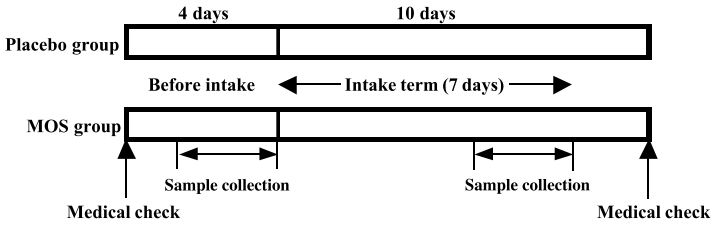


**Fig. 1.** The Test Schedule
Throughout the experiment, the subjects were given the standardized meals.

**Table 1.** Amount of Energy and Fat in Food Intake

| | Placebo | | MOS | |
|---|---|---|---|---|
| | Before intake | Intake | Before intake | Intake |
| Intake energy (kcal/day) | 1653.5 ± 62.1 | 1615.8 ± 68.7 | 1664.7 ± 54.9 | 1650.3 ± 59.1 |
| Intake fat (g/day) | 39.8 ± 0.1 | 40.1 ± 0.1 | 39.8 ± 0.1 | 40.1 ± 0.1 |

Values expressed as the mean ± SEM.

and female subjects were selected by the supervising physicians on the basis of their suitability for this trial.

**Test Schedule and Fecal Sampling** —— Figure 1 shows the test schedule of this experiment. The subjects were divided into the MOS and placebo groups, which were administered a different test drink. After the four-day before intake period, both MOS and placebo groups started consuming the test drinks for seven days. The volume of the MOS and placebo drinks administered was set at 300 ml per day, an equivalent of 3.0 g of MOS per day. Throughout the experiment, the subjects were given the standardized meals. Although standardized meals were the same energy, the menu changed every day. The subjects were asked to report on any leftovers to allow for the assessment of actual energy and fat intake. The subjects underwent physical examinations by doctors prior to the experiment as well as the third day after the closing of the experiment. All the fecal samples were collected for two days, from three days prior to the end of each period through to the final day of the before intake period and test period. The samples were weighed and immediately frozen for storage.

**Measurement of Fat in Feces** —— The level of fat in the feces was measured according to the methods of van der Kamer *et al*.[5] The daily average value for the fat being excreted and fat utilization was calculated according to the methods of Ishiguro *et al*.[6]

**Statistical Analysis** —— All of the data obtained were expressed as a mean ± the SEM. Using Student's paired *t*-test the significance of the difference between the periods was evaluated as $p < 0.05$. The significance of the difference between the groups was evaluated using a Student's unpaired *t*-test as $p < 0.05$.

## RESULTS AND DISCUSSION

The medical examinations performed by physicians on the third day after the closing of the experiment revealed that the subjects had suffered no adverse effects. None of the subjects complained of any abnormal symptoms. This led us to conclude that this experiment was completed without any safety issues and abnormal consequences.

Table 1 shows the average energy and fat intake per day during the experiment. There was no significant difference between the placebo and MOS groups in this regard. Therefore, it was assumed that the intake was even between the treatment groups throughout the experiment.

Figure 2 shows the effect of the liquid coffee drink containing MOS on the average amount of fat being excreted per day. In the amount of average excreted fat, the beverage containing MOS intake showed a significant increase in comparison with the before intake group and placebo group ($p < 0.05$ and $p < 0.001$, respectively). On the other hand, there was no statistically significant difference in the pla-

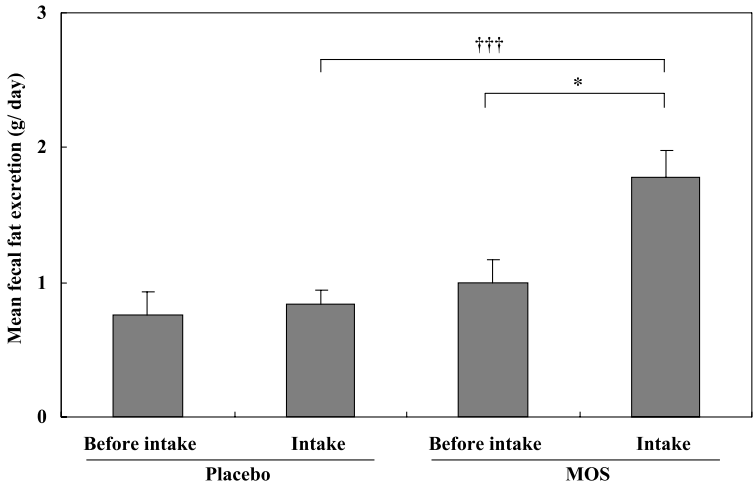


**Fig. 2.** Effect of the Liquid Coffee Drink Containing MOS on the Average amount of Excreted Fat Per Day

Values expressed as the mean ± SEM of g/day. *: Statistically significant from before intake period ($p < 0.05$), †††: Statistically significant from placebo intake group ($p < 0.001$).

**Table 2.** Effect of MOS Intake on the Rate of Fat Utilization

| Placebo | | MOS | |
|---|---|---|---|
| Before intake | Intake | Before intake | Intake |
| 98.1 ± 0.4 | 97.9 ± 0.3 | 97.6 ± 0.5 | 95.4 ± 0.5*,††† |

Values expressed as the mean ± SEM (%). Statistically significant from before intake (*$p < 0.05$). Statistically significant from placebo intake (†††$p < 0.001$).

cebo group before and after the test period. Table 2 shows the effect of the liquid coffee drink containing MOS on fat utilization. In the fat utilization, the beverage containing MOS intake showed a significant decrease in comparison with the before intake group and placebo group ($p < 0.05$ and $p < 0.001$, respectively). However, there was no statistically significant difference in the placebo group before and after the test period.

The previous report suggested that MOS 1.0 g/day intake was effective in increasing the concentration of fat in feces.[4] However, the total fat utilization and the total amount of excreted fat are unknown in this study. Therefore, this experiment focused on the effect of the body fat-reducing MOS drink (containing 3.0 g of MOS per day) in humans on the total amount of excreted fat and fat utilization in the body.

Generally, healthy adults are able to completely digest fats up to 150 g per day, of which less than 5 g are excreted.[6] Therefore, those individuals excreting more than 6 g of fats are regarded as having fat digestion problems. This experiment confirmed that the amount of fat excreted per day was significantly higher in the MOS intake group than the before intake period and placebo intake group. However, the amount of excreted fat by the MOS intake group was 5 g or less per day on average and the data showed not a single individual exceeding 5 g. Therefore, it was suggested that the intake of MOS was effective in increasing the amount of excreted fat, but within the normal range of fluctuation.

In this study, the intake of MOS also significantly lowered fat utilization compared to the before intake period and the placebo intake group. The data of the MOS intake group averaged around 95.4 ± 0.5%. This downward shift in fat utilization was regarded as being within the normal range of fluctuation, since the criteria set by the Ministry of Health, Labor and Welfare stipulates that a fat utilization falling short of 91.1% is the benchmark for inhibition of fat absorption.[7]

These results showed that the intake of MOS 3.0 g/day had no adverse physical effects in humans while it contributed to a lower fat utilization and higher total amount of excreted fat. These effects might be a part of the body fat-reducing mechanism of MOS and possibly linked with the functionality of MOS to inhibit fat absorption.[8]

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