

**Title: Association between dietary factors and the prevalence of non-alcoholic fatty liver disease in middle-aged Japanese**

Name: Ryoko Tajima

**Introduction:** Non-alcoholic fatty liver disease (NAFLD) is characterized by fat accumulation in the liver, which is not caused by excess alcohol intake. NAFLD is considered as a global public health issue, and it is important to clarify the modifiable risk factors, such as dietary habits, for NAFLD. Previous studies in Asian countries reported that percentage of energy intake from carbohydrate was positively associated with type 2 diabetes risk. NAFLD and type 2 diabetes share insulin resistance as their pathogenic mechanism. Therefore, high intake of carbohydrate might be also associated with NAFLD prevalence in Asia. On the other hand, some researchers considered soft drink as one of the most important dietary factors for the prevention of NAFLD. Soft drinks is dietary source of fructose which is possible enhancer of lipogenesis in the liver. Although fruit is another dietary source of fructose, fruit as well as vegetables also supply vitamin C and dietary fibers which are considered to be protective against insulin resistance.

In this study, we examined the relationship of the intake of main dietary sources of carbohydrate in Asia (rice, bread, and noodles), as well as percentage of energy from carbohydrate, and soft drink intake with NAFLD prevalence in Japanese (Study 1). In addition, we examined the association between intakes of fruit and vegetables and NAFLD prevalence in the same participants (Study 2).

**Methods:** Participants were male and female examinees who had complete health check-up in a hospital in Tokyo, Japan in January to April, 2015. Dietary factors including alcohol intake were assessed using brief type self-administered diet history questionnaire (BDHQ). Fatty liver was diagnosed using abdominal ultrasound diagnosis. Participants with excess drinking (alcohol intake  $\geq 30$  g/day in men,  $\geq 20$  g/day in women) and other causes of fatty liver were excluded from the analysis. Finally, 977 men and 1,467 women aged 40-69 years were included in the analysis. Odds ratios (ORs) and 95% confidence intervals (95% CIs) for each dietary factor were calculated by logistic regression analysis adjusted for age, BMI, habitual exercise, current smoking, energy intake, alcohol intake, dietary fiber intake (not for ORs for fruits and vegetables), eicosapentaenoic acid and docosahexaenoic acid intake, coffee intake, and soft drink intake (not for ORs for soft drink).

**Results:** NAFLD was diagnosed in 341 men and 171 women. Mean (SD) carbohydrate intake was 54.2% (6.9%) of energy in men and 53.4% (6.4%) of energy in women (Study 1). Rice was the major contributor to

dietary carbohydrate intake (41.0% in men and 34.5% in women). In men, there was no relationship of carbohydrate, rice, bread, and noodles intake with NAFLD prevalence. However, in women, positive association was observed between NAFLD and carbohydrate intake (p for trend =0.008), as well as rice intake (p for trend=0.006). OR (95%CI) for the highest vs. lowest quartile category of rice intake was 1.87 (1.03, 3.41). Around 40-50% of men and women did not consume soft drinks and there was no clear relationship of soft drink with NAFLD in both sexes. Fruits and vegetables were important dietary sources of vitamin C and dietary fiber (Study 2). However, intake of fruits and vegetables was not associated with NAFLD prevalence in both sexes.

**Conclusion:** Our findings suggest that carbohydrate and rice intakes, rather than soft drink intake, are important targets for NAFLD prevention in Japanese women. The results also suggest that there is no need for Japanese to restrict fructose intake from fruits to prevent NAFLD. These data showing the association between specific dietary factors and NAFLD are valuable in considering the preventive strategies for NAFLD in Japanese.