The effect of nutritional intervention for pregnant women on dietary folate and vitamin D intakes: A randomized controlled trial

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Introduction

Appropriate nutrient intake is important for pregnant women. In Japan, folate and vitamin D intakes among pregnant Japanese women are lower than the dietary reference intakes for Japanese (DRIs-J) (Takimoto H et al., 2003). Deficiency of folate and vitamin D causes pregnancy complications and inhibition of fetal growth. Therefore, improving dietary intake is important for pregnant women.

Objectives

This study aimed to investigate the effect of nutritional intervention on dietary folate and vitamin D intakes among pregnant women.

Methods

Design: Randomized controlled trial
Settings: At a university hospital in Tokyo, Japan
Study period: From November 2014 to November 2015
Participants:
A total of 117 primiparous women with singleton pregnancy and without complications that restrict diet or exercise
Study protocols and schedules:

- A randomization number table was generated using the statistic software R (R, version 3.0.3 for Windows) by a researcher who was not involved in the recruitment.
- Participants were randomly assigned to the intervention group or the control group.
- When participants attended the prenatal checkup at baseline and 28 gestational weeks (midpoint) they answered questionnaires. The intervention group received the nutritional guidance twice at the next prenatal visit after baseline and midpoint (Figure 1).
- Outcome assessments were conducted at 36 gestational weeks (endpoint) and compared with nutrition data obtained at 20 gestational weeks (baseline).

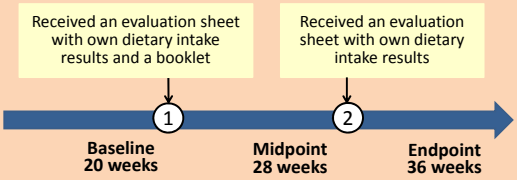

Figure 1: Assessment and intervention schedule

Interventions:

A) The intervention group received an evaluation sheet with own dietary intake results and the comparison of the results with the DRIs-J to facilitate goal-setting.
B) Another intervention was the distribution of a 32-page booklet that described the impact of dietary intake on pregnancy complications and fetal growth; nutrient-rich foods and their nutrient content; the strategy for improving nutrient intake from diet; and easy-to-cook recipes.


Intervention A) Intervention B)
Figure 2: Picture of interventions

Usual care in all participants:
At the university hospital, all pregnant women regularly receive prenatal health guidance by doctors, midwives, and nurses.
Outcome data:
Dietary intake: the brief-type self-administered diet history questionnaire (BDHQ), which is a 4-page structured questionnaire that collects the intake frequency of 58 foods and beverages as well as dietary habits during the previous month. In the analysis, folate and vitamin D intakes were energy-adjusted using the density method to reduce intra-individual measurement errors.
Ethics:
Approved by the Ethics Committee of the University of Tokyo (No. 10401) and was registered as a clinical trial (UMIN: 000015644).
Analysis:
Mann-Whitney U test was performed for comparing dietary intakes and the variation between groups using Statistical Package Social Sciences ver. 22. Two-tailed *p* value <0.05 were considered statistically significant.

Results and Discussions

Of 117 participants, 19 dropped out and 14 were excluded because of the unrealistically energy intake. The analysis was conducted with 84 women (intervention group, n=45; control group, n=39). Table 1 shows the demographic characteristics at baseline.
Table 2 shows the dietary intakes at baseline and endpoint.
At baseline, the dietary folate and vitamin D intakes were not significantly different between groups.
At endpoint, the dietary folate intake was significantly higher in the intervention group than in the control group.
From baseline to endpoint, the dietary folate intake increased significantly in the intervention group compared to the control group.

Table 1. Participants' demographic characteristics at baseline

	Intervention group (n=45) mean ± SD or n (%)	Control group (n=39) mean ± SD or n (%)
Age [years]	34.6 ± 4.9	34.8 ± 4.4
Pre-pregnancy body mass index		
〈 18.5 [kg/m^2]	8 (17.8)	8 (20.5)
≥ 18.5 and 〈 25.0 [kg/m^2]	36 (80.0)	30 (76.9)
≥ 25.0 [kg/m^2]	1 (2.2)	1 (2.6)
Educational level		
High school	1 (2.2)	1 (2.6)
Junior or technical college / university	44 (97.8)	38 (97.4)
Working	30 (66.7)	35 (89.7)
Insufficiency of dietary intake according to DRIs-J		
Folate	42 (93.3)	33 (84.6)
Vitamin D	20 (44.4)	17 (43.6)

No significant difference was observed in the dietary vitamin D intake. Vitamin D is produced not only through diet but also in the skin from sunlight exposure. Therefore, it may be difficult to investigate the effect of nutritional intervention using only dietary vitamin D intake.

Table 2. Energy-adjusted dietary intakes and changes in energy-adjusted dietary intakes from baseline to endpoint

	Intervention group (n=45) Median (interquartile range)	Control group (n=39) Median (interquartile range)	*p*
Dietary intakes at baseline			
Energy [kcal]	1710.1 (1373.1 – 2001.8)	1454.2 (1324.1 – 1819.7)	0.155
Folate [μg/1000kcal]	179.0 (147.9 – 217.8)	169.7 (145.8 – 231.2)	0.975
Vitamin D [μg/1000kcal]	4.8 (3.2 – 6.5)	5.0 (3.3 – 7.3)	0.664
Dietary intakes at endpoint			
Energy [kcal]	1632.1 (1395.0 – 1853.3)	1485.0 (1350.3 – 1811.6)	0.433
Folate [μg/1000kcal]	210.8 (159.7 – 249.2)	179.8 (147.9 – 210.2)	**0.025**
Vitamin D [μg/1000kcal]	5.8 (4.2 – 8.6)	6.3 (3.6 – 8.6)	0.989
Changes in dietary intakes from baseline to endpoint			
Folate [μg/1000kcal]	22.7 (-6.0 – 63.0)	-9.6 (-42.8 – 41.9)	**0.024**
Vitamin D [μg/1000kcal]	0.7 (-0.7 – 3.8)	0.2 (-1.1 – 2.9)	0.454

Implications for practice

Nutritional intervention for pregnant women improved dietary folate intake at 36 gestational weeks. Further study is needed to develop effective intervention for increasing vitamin D intake.

Acknowledgement

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The result of this study included the participants recruited from November 2014 to July 2015, which is different from the abstract.