Comparison of dietary food and nutrient intakes by supplement use in pregnant and lactating women in Seoul

Hyesook Kim1, Won Jang1, Ki-Nam Kim2, Ji-Yun Hwang3, Hae-Kyung Chung4, Eun-Ju Yang5, Hye-Young Kim6, Jin-Hee Lee7, Gui-Im Moon8, Jin-Ha Lee7, Tae-Seok Kang7 and Namsoo Chang1§

1Department of Nutritional Science and Food Management, Ewha Womans University, Daehyeon-dong, Seodaemun-gu, Seoul 120-750, Korea
2Department of Food and Nutrition, Daejeon University, Daejeon 300-716, Korea
3Graduate School of Education, Sangmyung University, Seoul 110-743, Korea
4Department of Food Science and Nutrition, Hoseo University, Asan 336-795, Korea
5Department of Culinary Science, Honam University, Gwangju 506-714, Korea
6Department of Food and Nutrition, Yongin University, Yongin 449-714, Korea
7Nutrition and Functional Food Research Team, Ministry of Food and Drug Safety, Cheongwon 363-700, Korea
8Nutrition Safety Policy Division, Ministry of Food and Drug Safety, Cheongwon 363-700, Korea

Abstract
This study was performed to compare the dietary food and nutrient intakes according to supplement use in pregnant and lactating women in Seoul. The subjects were composed of 201 pregnant and 104 lactating women, and their dietary food intake was assessed using the 24-h recall method. General information on demographic and socioeconomic factors, as well as health-related behaviors, including the use of dietary supplements, were collected. About 88% and 60% of the pregnant and lactating women took dietary supplements, respectively. The proportion of dietary supplements used was higher in pregnant women with a higher level of education. After adjusting for potential confounders, among the pregnant women, supplement users were found to consume 45% more vegetables, and those among the lactating women were found to consume 96% more beans and 58% more vegetables. The intakes of dietary fiber and β-carotene among supplement users were higher than those of non-users, by 23% and 39%, respectively. Among pregnant women, the proportion of women with an intake of vitamin C (from diet alone) below the estimated average requirements (EAR) was lower among supplement users [users (44%) vs. non-users (68%)], and the proportion of lactating women with intakes of iron (from diet alone) below the EAR was lower among supplement users [users (17%) vs. non-users (38%)]. These results suggest that among pregnant and lactating women, those who do not use dietary supplements tend to have a lower intake of healthy foods, such as beans and vegetables, as well as a lower intake of dietary fiber and β-carotene, which are abundant in these foods, and non-users are more likely than users to have inadequate intake of micro-nutrient such as vitamin C and iron.

Key Words: Dietary intake, supplement, pregnant women, lactating women

Introduction
Dietary supplement usage has been increasing along with the rapid economic growth in the general population of Korea [1], and supplemental usage may be regarded as common among some subgroups, including pregnant and lactating women [2]. Current knowledge regarding the benefits of dietary supplements has led to recommendations and guidelines for their use within specific population subgroups, for example, iron and folic acid supplementation has been advised for pregnant women [3,4]. The use of dietary supplements during pregnancy may provide an important contribution to nutrient intake [5]. Maternal nutrition is an important factor which is responsible not only for the health of the baby, but also for the baby’s long term growth [6-8]. Like pregnancy, lactation represents a period of the life cycle which is characterized by increased nutrient requirements which may or may not be easily achieved by diet alone [9]. Thus, many women opt for dietary supplements so as to ensure the supply of a number of micronutrients, such as iron and folic acid. However, the use of dietary supplements during lactation is even less well documented than that during pregnancy.

Several studies conducted among the US general population have reported that factors related to higher supplement use included being female, older, more educated, non-Hispanic white,
Physically active, normal or underweight, nonsmokers, and having a higher intake of nutrients from food [10-12]. Although correlation does not infer causality, it is likely that these factors, all of which tend to be related to positive health practices, drive supplement use, and that individuals at greater risk of poor health are generally less likely to take supplements. Interestingly, however, even in developed countries such as the US, less is known about the association between supplement use and the dietary food and nutrient intakes in pregnant and lactating women than that which is known of the general population.

Recently, from the third Korean National Health and Nutrition Survey data, it has been reported that there was difference in the nutrient intake from natural food sources, socio-demographic factors such as age, income and education level, and lifestyle factors among supplement users and non-user in Korean general population [1]. However, to our knowledge, no study has been carried out to investigate the association between supplement use and the dietary food and nutrient intakes of Korean pregnant and lactating women. Therefore, the aim of the present study was to compare the dietary food and nutrient intakes according to supplement use among pregnant and lactating women living in Seoul, South Korea.

Subjects and Methods

Study Subjects

This study was performed through face to face interview of 201 pregnant (> 12 weeks of gestation) and 104 lactating (<12 months of lactation) women, who agreed to the survey after receiving a full explanation of the nature of the study. The subjects included those who visited the public health center at Y district, one of the 25 districts in Seoul, South Korea, from May to July of 2012. They were women who visit public health center regularly to receive the nutritional supplements such as iron, folic acid tablets or to vaccinate their children or etc., and were not women who participate in the Nutri Plus program (Korean Supplemental Nutrition Program for Women, Infants, and Children). This study protocol was approved by the Institutional Review Board of Ewha Womans University (IRB NO. IRB 2012-1-2).

General characteristics

All of the participants were interviewed by trained interviewers, so as to obtain general information on demographic factors, socioeconomic factors, and health-related behaviors, including age, height, weight (pre-pregnancy and present), education, family income, employment status, alcohol consumption, and exposure to passive smoking. BMI was calculated as weight (pre-pregnancy and present) in kilograms divided by the square of height in meters, using self-reported height and weight data.

Education levels were categorized as follows: ≤ high school (not educated, dropped out of primary school, graduated from primary school but dropped out of middle school, graduated from middle school but dropped out of high school, or graduated from high school), ≤ university (graduated from a 2-y university program or dropped out of a 4-y university program), and > university (graduated from a 4-y university program or graduated from graduate school or higher). Family monthly income was categorized as follows: < US$ 2,000, US$ 2,000-4,000, and > US$ 4,000. Employment status was classified as: employed (full-time), and non-employed (part-timer or unemployed). Alcohol consumption was classified as drinker and non-drinker. Exposure to passive smoking was defined as being exposed to someone else's cigarette smoke either at home or at work.

Dietary supplement use

The study participants were asked whether they currently used any vitamin or mineral supplements. Users were also asked to report, in detail, information regarding the brand names of dietary supplements and frequencies of consumption. Daily nutrient intakes from dietary supplements were calculated by using these frequencies and the nutrient contents of the supplements. The dietary folate equivalent (DFE) was calculated based on 1.0 µg DFE being equivalent to 1.0 µg of food folate, or 0.6 µg of folic acid for supplemental folic acid taken with meals [13].

Dietary assessment

Dietary intake data were estimated by a trained dietitian using a 24-h recall method. The food items most frequently eaten were prepared as defined units and were shown to the subjects to help them report their volume of intake with greater accuracy. The subjects’ dietary intakes of food and nutrient were assessed using a computerized nutrient-intake assessment software program (CAN-Pro 3.0, Korean Nutrition Society, Seoul, Korea). Nutrient intake data of diet only and diet including supplements were compared with the Estimated Average Requirements (EAR) of Korean Dietary Reference Intake [14]. We also assessed the proportions of subjects who met the two guidelines (Have dairy products more than 3 times a day / Eat meat, fish, vegetables and fruits every day) that are available to assess from the 24-h recall data among the six guidelines of “Dietary Guidelines for Pregnant and Lactating Women, Korea”. Among these guidelines, “Eat meat, fish, vegetables and fruits every day” was classified into three categories as follows: meat, fish, eggs or beans; vegetables, fruits, and it was assessed whether the amount of consumption for each food exceeded the 1 serving/day. Serving sizes of representative food items in each food groups were defined according to the Korean Dietary Reference Intake [14].