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Dietary Patterns among Pregnant Women in the West-North of Iran

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Abstract: This study was conducted to assess the food consumption pattern and nutrient intakes of pregnant women residing in Maku-the west north of Iran. In this cross-sectional study, 284 pregnant women (142 from urban area and 142 from rural areas) participated. Subjects were interviewed privately, face-to-face. Dietary intake data was collected using two 24 h recalls and a food frequency questionnaire for 3 months. Mean consumption of grains and dairies was higher in rural women compared to their counterparts in urban areas. Women in urban areas consumed 140 g fruits compared to 248 g consumed by rural women. There were no significant differences regarding consumption of vegetables, pulses, fat and oils between these two groups. All women consumed adequate amount of energy, protein, thiamin and niacin (>75% RDA). Intake of vitamin B6, folate, vitamins A and D, iron, phosphorus, calcium, magnesium and zinc was not sufficient in these women. Inadequate intake of vitamin C and riboflavin was also reported in urban women. Percentage of energy from carbohydrate, fat and protein was 66, 23 and 11% for urban women, respectively and 68, 20 and 12% for rural women, respectively. Iron intake was lower in urban women compared to rural women. The findings indicated that rural women have better nutritional status than urban women. Future studies should determine factors associated with food consumption pattern in these women.

Key words: Food consumption pattern, nutrient intake, pregnant women, diet, Iran

INTRODUCTION

Adequate nourishment is a human basic need and essentiality of life. Nutrient requirement is influenced by genetic and environmental factors, food pattern, age, sex and growth rate. Therefore, vulnerability to nutrient deficiencies differs among individuals (Foroozani *et al*., 1995). Pregnancy occupies a critical and unique place in the course of life, which has both health and social importance for individuals, family and the whole of society (Panwar and Punia, 1998). Thus, in this course quantity and quality of nourishment is of particular importance. The incidence of dietary inadequacies is higher during pregnancy than at any other stage of life cycle. The expectant mothers appear to be more vulnerable to malnutrition owing to considerable stress during pregnancy because of physical, metabolic and hormonal changes (Panwar and Punia, 1998).

In developing countries such as Iran, women-particularly of deprived districts-are nutritionally at risk. Gender biases influence the food distribution within family with women as the last recipient of food both in quality and quantity. Some studies suggest that the nutritive status of women during gestation and even prior to pregnancy has a great impact on the health of both mother and newborn and pregnancy outcome (Panwar and Punia, 1998; Dava *et al*., 1980; Antal *et al*., 1997). If energy intake is insufficient, there is an increased risk that the newborn will have a low birth weight, whilst obesity is associated with hypertension, preeclampsia and gestational diabetes (Osrin and Costello, 2000). Thus it is important to identify the food consumption pattern and nutritional status of this group so that corrective measures can be implemented in time. Maku is a town in west Azerbaijan province to the west north of Iran. No information exists on the dietary pattern and nutrient intake of pregnant women residing in this town. The present study, therefore, was carried out to obtain information on food consumption pattern and nutrient intake of urban and rural pregnant women in Maku, which included a comparison of the average dietary intakes of rural pregnant women with their urban counterparts.

MATERIALS AND METHODS

Study participants: This cross-sectional study was performed in 2000-2001 in Maku, a city in the West-North of Iran near the border with Turkey. To identify dietary

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pattern and nutrient intake of pregnant women from different socioeconomic levels, two urban prenatal care centers and six health houses were chosen. The inclusion criteria were freedom from chronic diseases such as diabetes, being on no special diet, being between 18 to 35 years old. If the attending women were eligible, they were informed orally about the purpose of the study and those who agreed to participate, verbally consented. Two hundred and eighty four women (142 rural and 142 urban) from among 312 eligible ones agreed to participate. The proposal of this study was approved by ethical committee of the research council of School of Nutrition, Shaheed Beheshti University of Medical Sciences and informed written consent was obtained from each subject.

Data collection: Subjects were interviewed privately and by face-to-face method. Interviews were administered in the native language, Turkish and Farsi and through an interpreter if necessary.

At first, information on sociodemographics including age, educational level, occupation, household size and spouse's occupation as well as their menstruation and medical history was collected by trained interviewers using a pretested questionnaire. Then the data on dietary intakes during pregnancy was collected by means of quantitative 24 h food recall for two consecutive days and food frequency questionnaire for three months. Although the women's food consumption was recorded in the questionnaires on the 3 monthly basis, subjects were asked to estimate their consumption of different food items on daily (e.g., bread), weekly (e.g., rice, meat) or monthly (e.g., fish) basis. The subjects were asked to recall all foods and beverages consumed during preceding 24 h. To assist the women to recall accurately, household utensils were used. Portion sizes of consumed foods were converted to grams using household measures (Ghaffarpour *et al*., 1999). Each food and beverage was then coded according to prescribed protocol (William *et al*., 1998) and analyzed for content of energy and the other nutrients using Nutritionist-III (N3) Software program designed for Iranian foods. Almost all of foods eaten by our subjects could be coded. When a particular ethnic food was not in the database of N3, we coded it as a similar item. Although most of the subjects studied were taking prenatal vitamin-mineral tablets at the time of the diet history, these were not included in the analysis because we wanted to study dietary nutrients only. Energy and nutrient intakes were compared with the Recommended Dietary Allowances (RDA) (Food and Nutrition Board, 1989). All dietary data we reported here were based on the results from 24 h dietary recalls, because the FFQ we used in the current study was a qualitative one.

Statistical methods: The data were analyzed by computer using Statistical Package for Social Science (SPSS Inc.Chicago, IL, Version 10.0). Independent t-test were used to determine the degree of significance of differences between means. In those cases where the distribution of variables was not homogenous, the Mann-Whitney U-test was applied. In all statistical tests performed, p-values <0.05 were considered significant.

RESULTS

Table 1 shows mean daily consumption of food items by the subjects. Mean daily intake of bread and cereals of urban and rural women were 523 and 616 g, respectively. Urban women's intake was significantly lower than those in rural areas ($p<0.05$). Similarly, consumption of dairy products in urban women was significantly lower than that of rural ones ($p = 0.005$). Intake of meat and meat exchanges in urban women was higher than that of rural ones but this difference was not significant. Surprisingly, fruits consumption of urban women was significantly lower than that of rural women ($p = 0.02$). Intake of vegetables, pulses, fat and oils was not different between two groups. Sugar intake was higher in urban women ($p = 0.02$).

Comparisons of the two groups (Table 2) indicate that energy intake of urban women was lower than that of rural pregnant women but this difference was not statistically significant ($p>0.05$). Percent of energy derived from carbohydrate, fat and protein in urban pregnant women were 66, 23 and 11%, respectively and for rural women it was 68, 20 and 12%, respectively. Vitamin D, iron and calcium intake of rural women was significantly higher than their urban counterparts ($p<0.05$).

Considering Table 3, it is concluded that energy, protein, thiamin, niacin, pyridoxin and magnesium intake of all subjects were adequate (>75% RDA). But intake of folate, vitamin A and D, iron, calcium, phosphorus and zinc were inadequate (<75% RDA). In urban women, intake of vitamin C and riboflavin were also inadequate.

Table 1: Mean consumption (g day^{-1}) of food groups intake among pregnant women of Maku[1]

Food groups	Urban areas	Rural areas	p-value
Grains	523±193	616±149	0.03
Dairy products	163±650	291±740	0.005
Meat and alternatives	109±770	80±450	0.19
Fruits	140±117	248±182	0.02
Vegetables	99±320	127±520	0.23
Pulses	22±150	17±100	0.48
Fats and oils	26±140	24±130	0.77
Sugar and sweets	51±270	29±210	0.02

[1]All values are mean± standard deviation

Table 2: Energy and nutrient intakes of pregnant women participated in the study[1]

Nutrients	Urban areas	Rural areas	p-value
Energy (kcal)	2520.00±833	2656.00±506	NS
Protein (g)	66.90±24.3	71.10±12.2	NS
Vitamin C (mg)	46.30±31.6	55.70±27.4	NS
Thiamin (mg)	1.90±0.73	2.10±0.42	NS
Riboflavin (mg)	1.07±0.52	1.20±0.38	NS
Niacin (mg)	21.30±9.1	24.70±5.2	NS
Pyridoxine (mg)	1.28±0.17	1.31±0.19	NS
Cobalamin (μg)	1.90±0.65	1.70±0.82	NS
Folate (μg)	157.60±26.2	164.60±29.5	NS
Vitamin A (IU)	1454.00±970	1906.00±872	NS
Vitamin D (IU)	48.10±23.2	84.50±36.2	0.03
Iron (mg)	11.60±4.52	17.80±6.7	0.02
Calcium (mg)	545.00±271	738.00±262	0.008
Phosphorus (mg)	566.00±316	592.00±229	NS
Magnesium (mg)	82.20±25.6	66.40±35.8	NS
Zinc (mg)	10.30±2.6	9.42±3.7	NS

[1]All values are mean±standard deviation. NS: Non-significant

Table 3: Energy and nutrient intakes of pregnant women as percentage of RDA[1]

Nutrients	Urban areas	Rural areas
Energy	100.8±33.3	106.2±20.2
Protein	111.8±40.5	118.5±20
Vitamin C	62.2±45.1	79.5±39.1
Thiamin	126.6±48.6	140.0±27.3
Riboflavin	66.8±32.5	75.0±23.7
Niacin	125.2±53.5	145.2±30.5
Pyridoxine	58.5±7.7	59.5±8.6
Cobalamin	86.3±29.5	77.2±37.2
Folate	39.4±6.5	41.0±7.3
Vitamin A	36.3±24.2	47.6±21.8
Vitamin D	12.0±5.8	21.1±9.0
Iron	38.6±15.0	59.3±22.3
Calcium	45.4±22.5	61.5±21.8
Phosphorus	47.1±26.3	49.3±19.0
Magnesium	27.4±8.5	22.1±11.9
Zinc	68.6±17.3	62.8±24.8

[1]All values are mean± standard deviation

DISCUSSION

The mean daily intake of major food items by the pregnant subjects was estimated from their reported consumption. All subjects were asked to report exactly the amount and frequency of food consumption. In general, recalling the amounts of bread, rice, meat, egg and pulses was easy for the subjects while most had difficulty in estimating the amounts of vegetables and fruits consumed. None of the subjects consumed food items such as fish.

Usually, women from lower household size could give a more precise estimate of the amount of foods consumed. All subjects generally followed the traditional Iranian food pattern although the effects of food habits were evident. The main meal of the day was lunch or dinner. Although most subjects ate breakfast, its contribution to daily energy intake was not much. Breakfast consisted of tea with bread, yogurt and cheese and in some cases, milk. Consumption of butter, jam and honey for breakfast was rare. Bread and potato were the staple foods. Rice was consumed two to three times per week. In general, if one meal included rice, the other did not. Snacks were usually bread, cheese and tea and occasionally fruits. Most of these findings were consistent with those of Rahmanifar and Bond (1990) in Shiraz.

Mean daily consumption in this study was lower than those reported in other countries (Panwar and Punia, 1998). Because of high calcium content of dairy products, women are encouraged to increase their intake during pregnancy (Rahmanifar and Bond, 1990). The reported intake of milk products and calcium seen in these subjects could impair the health of mother and the newborn. The higher consumption of dairy products in rural women than urban ones may be due to keeping their own milch animals in the house. Higher intake of dairy products by rural adults has been reported earlier by Panwar and Punia (1998). The finding of higher fruit intake in rural as compared to urban areas was surprising. The expectation is higher intake of fruits in urban areas because those residing in urban areas have higher educational levels and previous studies have shown healthier diet among those with higher educational levels. In the current study, higher fruit intakes in rural areas might be attributed to seasonal variation and more availability of fruits in rural areas.

Energy and nutrient intake in this study, in comparison with that of RDA, showed intake of folate, vitamin A, D, iron, calcium, phosphorus and zinc to be inadequate (<75% RDA). In urban subjects, also, inadequate intake of vitamin C and riboflavin should be added to the mentioned nutrients.

Ortega *et al.* (1998) reported inadequate intake of vitamin B6, folate, iron, calcium, zinc and magnesium in their study but vitamin A, D and phosphorus intake of their subjects were adequate. The high mean vitamin C intake of their subjects was attributed to isoascorbic acid, which has no vitamin C activity, being added as antioxidant to processed foods.

The lower intake of folate in the present study is probably due to lower intake of vegetables. Since the recommended intake for folate is increased during pregnancy, increased consumption of dark-green vegetables by pregnant women should be encouraged. Currently, at least three servings of vegetables and two servings of fruits per day are recommended for the general population. Pregnant women should consume an additional serving of vegetables and fruits to help meet their increased energy and nutrient needs.

Mean energy intake in this study was higher than those reported for pregnant women in previous studies Tunikabon and Ramsar (Pouretedal, 1998), Bandar Abbas (Habibi, 1997), Kerman(Doostan, 1996), Karaj-Shemiranat (Houshiar-Red *et al*., 1998).

Protein intake was higher than all above-mentioned studies except for Karaj-Shemiranat which was similar to our study. Calcium intake was lower than that reported in west-Azarbayejan (Allafmoghaddam, 1998) and Karaj-

Shemiranat women (Houshiar-Red, 1998). In theory, insufficient calcium supply during pregnancy could result in maternal bone loss or impaired fetal bone development (Prentice, 1998). Further interpretation of the food energy and nutrient intakes determined in the current study is limited by the lack of published data on dietary intakes of Iranian pregnant women, which could serve as a basis of comparison.

Lower calcium intakes of urban pregnant women than their rural counterparts may be due to lower consumption of dairy products. Although consumption of meat and alternatives were high in urban women, their meat consumption, alone, was lower than that of rural ones. This can probably explain higher intake of rural women. Recent studies differentiated animal and vegetable proteins in terms of their effect on human health. Unfortunately, we couldn't analyze the data separately by animal and vegetable protein intake in this group of pregnant women due to limitations of Iranian food composition table. Therefore, identifying the quality of protein intake among pregnant women is warranted. Another important issue that should be kept in mind is the importance of other nutrients in pregnancy. On of these conditionally essential nutrients during pregnancy is choline which plays an important role in fetal brain development. We couldn't determine its' intake in this study, because Iranian food composition table is very incomplete and the choline content of Iranian foods have not been assessed. Future studies might consider this important nutrient.

The results reported here suggest less than acceptable nutritional status in pregnant women of Maku. Education regarding increased needs during this period is called for. In order to identify factors affecting dietary pattern and nutrient intake of pregnant women residing in this district, further investigation is needed.

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