Assessment of the dietary intakes of healthy adult pregnant women in Cyprus

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Introduction

The role of nutrition prior to, and throughout, pregnancy is now well recognized. Among the variables that influence the outcome of pregnancy (such as income, health, education, family and fertility), food and nutrition are an important and modifiable one (Godfrey and Barker, 1995). Studies have shown the importance of nutrition in prenatal development. Maternal nutrition significantly affects the woman’s health and the growth, development and health of the infant she carries (Hautvast, 1988). Being underweight is strongly linked to infertility. Amenorrhoea and infertility are a complication found in anorexia nervosa after excessive weight loss. As the body mass index falls, the risk of infertility increases.

Accordingly, maternal dietary habits may play an important role for the future health of the offspring, since poor intra-uterine growth has been linked to cardiovascular diseases and diabetes.

A woman’s nutrient needs during pregnancy exceed RDAs for non-pregnant adult women. RDAs for pregnant women recommend an addition of 200-300 kilocalories during the second and third trimesters of pregnancy (Durnin, 1987). Diets during pregnancy should have high nutrient density, providing a good source of protein. The recommendation for protein allows an additional 10g per day (Hytten and Leitch, 1971). Adequate protein consumption during pregnancy is important, but excessive protein may have adverse effects.

Because the recommendation of many vitamins is based in food energy and protein intakes (which increase during pregnancy), and because tissue synthesis is very rapid, the recommendations for vitamins are higher during pregnancy (Food and Nutrition Board, 1989). In particular, the need for folate is increased due to the large increase in the mother’s blood volume and the rapid growth of the fetus (Butterworth and Benedich, 1996).

The need for minerals, like calcium, phosphorus and magnesium, is also increased during pregnancy because they are involved in the building of the skeleton (Munro and Hamish, 1979). Iron needs are also very high during pregnancy for the manufacture of haemoglobin in both maternal and fetal blood cells (Scholl et al., 1992). The fetus accumulates most of its iron during the last
Few women enter pregnancy with adequate iron stores, so most scientific committees recommend an iron supplement during pregnancy, even though this is still a controversial issue (Hemminki and Mariläinen, 1995).

Zinc is another nutrient of vital importance in pregnancy, since it is involved in protein synthesis (Apgar, 1985). Studies have shown that pregnant women do not always have sufficient zinc intakes. Studies in developed countries have shown that the diets of pregnant women, with the exception of those with a low socioeconomic status, are likely to have adequate amounts of most nutrients, the most likely exceptions being iron, folate, zinc and magnesium (Johnson et al., 1994; Rogers and Emmett, 1998).

The diets of pregnant women in Greece and Cyprus have not been adequately studied. The Greek-Mediterranean diet traditionally followed in these countries is a diet rich in monounsaturated fatty acids, vitamins and minerals (Helsing and Trichopoulou, 1989). Younger generations have moved away from the traditional diet and have adopted a more westernized diet (Hassapidou et al., 1997), whereas the traditional diet is mainly kept today by the elderly populations (Papanikolaou et al., forthcoming).

The present study aims to assess the dietary intakes of healthy adult pregnant women in Paphos, Cyprus, and to compare the results with the rest of the Greek population. In addition, the present study might help to assess whether the present dietary recommendations are followed and if they emphasize the appropriate issues.

Methodology

Subjects
A total of 138 healthy adult pregnant women, aged 20-34 years, were invited to participate in the study. They were randomly selected from those attending the maternity clinic in the General Hospital of Paphos. From the initial sample of 138 women, during the analysis of the results, 38 were excluded because of incomplete dietary records. Therefore, the final sample consisted of 100 women.

Data were collected by the dietitian during the first, second and third trimesters of pregnancy.

Questionnaire
A general questionnaire was completed by each pregnant woman in the beginning of the study. The questionnaire included 20 questions regarding age, physical activity, family status and eating habits. The mean age of the subjects was 27.4 years (SD = 5.6).

Dietary intake
Each woman completed a three-day weighed dietary diary three times during the first, second and third trimester. After receiving the appropriate instructions, the women weighed, described and wrote down all items of food and drink consumed for three consecutive days including one Saturday or Sunday.

Food was weighed in spring balances, accurate to ±2g, which were provided for the women. Vitamin and mineral supplement usage was also included in the dietary record. After each recording period, the records were checked by the dietitian, who also guided the record keeping.

Data analysis
The diaries completed were coded using McCance and Widdowson’s food tables (Paul and Southgate, 1991). All data were analysed using the Microdiet Food computer program. Greek food recipes were added in the basic database according to the Food Composition Tables and Composition of Greek Cooked Food and Dishes (Trichopoulou, 1992). All data were analyzed statistically using Microsoft Excel.

Results

At the start of pregnancy 20 per cent of the participating women had body mass index (BMI) below 20, 72 per cent had BMI between 20 and 25 and the remaining 18 per cent above 25. The average weight gain was 13.8 ± 3.6kg, and it was not related to prepregnancy BMI.

Table I shows the energy and nutrient intake of the women participating in the study. It can also be seen that there is no statistically significant difference in the energy intake of women between the three trimesters, and that proteins provide 22-27 per cent of energy intake, showing a high protein intake (mean intake of 2g/kg body weight). The highest protein intake was observed in the third trimester. Fat intake was low in all three trimesters (27-29 per cent of energy intake).
The monounsaturated fatty acid-to-saturated fatty acid ratio (MUFA/SFA) was about 1.2, whereas polyunsaturated fatty acids (PUFA) intake represented approximately 13 per cent of total fat intake. The lowest fat intake was found in the third trimester when the highest protein intake was also observed.

Table II presents the intakes of micronutrients of pregnant women. As can be seen from this Table, all women had low intakes of vitamin D and folate. The rest of the vitamins were consumed in adequate quantities. No significant difference was observed in the intake of vitamins between the three trimesters.

Iron intake was lower than the recommendation for pregnancy, but all women were taking iron as a supplement. The intake of calcium was above the recommendations and that was mainly due to the increased intake of milk and milk products that most women reported.

All the pregnant women reported taking iron products as a supplement and 38 per cent reported taking a multivitamin and mineral supplement.

### Discussion

Nutritional status and health in pregnancy are a very important matter. Health in later life may be partly determined by intra-uterine growth and development.

The nutritional status of 100 healthy pregnant women was assessed in the present study. No relationship was found between the prepregnancy body weight, the energy intake during pregnancy and the weight gain during pregnancy. Other investigators have shown an inverse relationship between maternal prepregnancy BMI and weight gain during pregnancy (Begmann et al., 1977). The absence of this finding in this study is probably due to the low number of under- or overweight women participating in the study. A total of 18 women were overweight, but had BMIs between 25 and 28.

The energy intake of the pregnant women in this study did not change during the second or third trimester according to recommendations. Mean energy intake throughout pregnancy was similar to the values reported in other studies on pregnant women.
women in other countries. Erkolla et al. (1988), for example, reported a mean energy intake of 2,173 ± 421 kcals for pregnant women in the third trimester, in a recent study in Finland.

Although the energy intake of pregnant women in our study is slightly below recommendations (Food and Nutrition Board, 1989), especially for the second and third trimester, it must be noted that a number of scientists (King et al., 1994; Van Raaij, 1995) suggest that the recommended energy intake for pregnant women is too high and that the energy cost of pregnancy is lower in Western countries. Further studies are needed, however, before a quantitative conclusion can be drawn (Saha, 1986).

Protein intake was high especially in the third trimester. Women reported that they mainly increased their meat intake in order to cover their increased protein needs. Total fat intake was according to recommendations. A high intake of monounsaturated fat was observed and this can be attributed to the high olive oil intake that is a characteristic of the Greek diet.

In a recent study carried out by Petridou et al. (1998) among pregnant women in Greece, the relationship between diet during pregnancy and birthweight was investigated. The study showed that among energy-generating nutrients, monounsaturated fat was positively associated with increased birthweight.

Approximately half of the energy in the diet of pregnant women derived from carbohydrates. Sugar intake was 15 per cent of total carbohydrate intake and it was lower than the sugar intake of pregnant women found in other studies (Erkolla et al., 1988).

Intakes of vitamins and minerals met or exceeded the recommended allowances with the exception of vitamin D, folate and iron. Vitamin D intake was very low but it should be noted that women in Cyprus have a high exposure to sunlight and therefore vitamin D is synthesized. Folate intake was also low, but 38 per cent of the women reported taking a vitamin supplement containing folate.

Iron intake was also lower than the recommendations but all women reported taking iron supplements. In a similar study on pregnant women in the UK it was also reported that the intakes of iron and folate were inadequate (Johnson et al., 1994). Similar findings have also been reported by other investigators (Rogers and Emmett, 1998), showing that pregnant women should be advised to increase the intake of foods rich in these nutrients.

Conclusions
The present study aimed to assess the dietary intakes of healthy adult pregnant women in Cyprus, and to compare the results with the rest of the Greek population. It also aimed to help to assess whether the present dietary recommendations are followed and if they emphasize the appropriate. Based on the above findings, the conclusion can be drawn that the diet of the participating pregnant women was adequate in energy and balanced in macronutrients. The intakes of vitamins and minerals met or exceeded the recommended allowances with the exception of vitamin D, folate and iron.

References
Helsing, E. and Trichopoulou, A. (Eds) (1989), "The Mediterranean diet and food culture ± a

Trichopoulou, A. (1992), Food Composition Tables and Composition of Greek Cooked Food and Dishes, Athens.