

A STUDY OF MATERNAL DIETARY INTAKE DURING PREGNANCY IN RIYADH, SAUDI ARABIA

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هدف الدراسة : أجريت هذه الدراسة لتقييم النظام الغذائي للنساء الحوامل و علاقته بالمواليد.
طريقة الدراسة: شملت العينة 114 امرأة حامل في الأسابيع العشرين الأخيرة من فترة الحمل. جمعت عينة النساء الحوامل من عيادة الحوامل في مستشفى الأمير سلمان في مدينة الرياض بالمملكة العربية السعودية وذلك باستخدام الاختيار العشوائي لأفراد العينة. تمت المقابلة الشخصية لكل امرأة لمدة ساعة عاباً خلالها الاستبيان و أخذت قياسات أبعاد الجسم بالإضافة إلى أخذ عينة وريدية من الدم وقد شمل الاستبيان الحالة الاجتماعية, استذكار الغذاء المستهلك خلال الساعات الأربع والعشرين السابقة للمقابلة, تكرار استهلاك بعض الأغذية, بالإضافة إلى العادات الغذائية لكل امرأة.

نتائج الدراسة: بلغ متوسط المستهلك من العناصر الغذائية الموصى بها للنساء الحوامل (RDA) المعدلات التالية: 51.8%, 93.9%, 82.5% و 98.2% لكل من الطاقة الغذائية, فيتامين ب1 (B1), الكالسيوم والحديد, على التوالي. كما أن ما نسبته 13.2% من النساء قد أحسسن بنوع من الوجع. وجد أن ما نسبته 2.8% و 4.4% من أفراد العينة كان لديهن نقص في التغذية, وذلك عند استخدام الطول و محيط وسط الذراع كمؤشرين لذلك, على التوالي.
الاستنتاج: للتقليل من المخاطر التي قد تتعرض لها النساء الحوامل ومواليدهن, لابد من الإرشادات الغذائية التي تسهل عليهن اختيار الأغذية عالية القيمة الغذائية.

الكلمات المرجعية: نظام غذائي الحوامل السعودية

Objective: This study was carried out to evaluate the dietary nutrient intake of pregnant women. The relationship between dietary intake and pregnancy outcome was also studied.

Method: A total of 114 pregnant women were studied, using systematic random sampling.

Results: The percentages of the mean nutrient intake below the recommended dietary allowances (RDA) for pregnant women were as the follows: 51.8%, 93.9%, 82.5% and 98.2% for energy, vitamin B1, calcium and iron, respectively. Moreover, 13.2% of the women experienced some form of pica. Using height and mid-arm circumferences, about 2.8% and 4.4% were seen to be undernourished respectively.

Conclusion: Saudi pregnant women need guidance in selecting nutrient dense foods to reduce maternal and outcome health hazards.

Key Words: Dietary intake, Pregnant women, Saudi Arabia.

INTRODUCTION

Throughout the world, pregnancy and lactation are considered vulnerable periods for both the mother and the child. The role of maternal health and nutrition has been emphasized by the recognition of the problem of low birth weight which affects some 20 million newborns annually, mainly in developing countries. This is

essentially an end result of interference with fetal growth following inadequate nutrition and infections in pregnant women in these countries.¹

Malnutrition in pregnancy not only has an ill effect on the newborn, but also impairs the mother's own health. When the pregnant woman's diet does not supply the required nutrients for her needs and for those of the fetus, the fetal requirements are met

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by withdrawing these from the tissues of the pregnant mother. This tissue depletion weakens the mother and increases the probability of serious complications and the chances of delivering an infant with low birth weight (LBW) who is unlikely to feed adequately early in life.² This is why some researchers suggest that improving food intake during pregnancy might reduce LBW.³

The economic development of the Kingdom of Saudi Arabia has been globally recognized. However, this rapid development and urbanization, coupled with the changing patterns of lifestyle and food habits, has precipitated the various health-related problems besides the nutritional problems already in existence before the nineteen seventies. The dietary habits of the Saudi people have been influenced by an influx of foreign workers, availability of wide range of imported goods, and a rise in purchasing power.⁴ The prevalent traditional eating habits coupled with the novel western lifestyle is leading towards the rising incidence of obesity.⁵

Rapid economic development and modernization have stimulated some interest in the dietary patterns of vulnerable groups. Data on the dietary patterns of 1200 pregnant Saudi women were collected using structured food frequency recall questionnaires.⁶ It showed that the average daily intake of pregnant Saudi mothers was far from satisfactory in three food groups (milk and its products, meat and vegetables). However, the consumption of cereals and fruits was adequate. Recently, the National Survey of pregnant and lactating women revealed that dietary practices of 50 to 70% of the respondents had not changed. However, 22.9% of lactating women and 13.6% of the pregnant ones had increased their consumption of dates.⁷ This could be due to their traditional beliefs about dates which are widely consumed local produce.

In a study of food habits of Saudi women during pregnancy, the percentage of women with dietary cravings, pica, and aversions were 38, 8.8 and 66.4 respectively.⁸ Identification of nutritional shortfalls that affected a substantial proportion of pregnant women may be useful in developing recommendations for nutrition education. We evaluated the nutritional status of a sample of pregnant women who came to the antenatal clinic at Prince Salman General Hospital in Riyadh, Saudi Arabia.

METHODS

A total of 114 pregnant Saudi women were selected by systematic random sampling from the antenatal clinic at Prince Salman Hospital in Riyadh, Saudi Arabia. All the women were in the last 20 weeks (second half) of gestation. They were healthy and had no chronic diseases. Based on records provided by the antenatal clinic, approximately 220 potentially eligible women were seen. The dietitian recruited 116 of these women (41.9%). The exclusion criteria included refusal, missing three appointments or delivery in another hospital (i.e. moved from the area). Although, the recruitment rates were somewhat low, the demographics of the study population were not more statistically significant than that of the total antenatal clinic population, which suggested that the cohort was generally representative.

Nutritional status was assessed in a personal interview. The interviews were conducted by a trained dietitian. Weight was measured to the nearest 0.2 Kg using Continental Scale Corporation Bridge View, Illinois, USA. The weight was taken without shoes and with as few clothes as possible. Height was measured in centimeters using a rod attached to the weighing scale.

Mid-upper arm circumference was measured to the nearest 0.1 cm using a flexible non-stretch tape. The women stood erect and sideways to the measurer. The point at the midpoint of upper left arm i.e. midway between acromion process and tip of the olecranon was located. The tape was wrapped gently, but firmly around the arm at midpoint and the measurement taken.

The triceps skinfold thickness was measured at the midpoint of the upper arm using Harpenden caliper. At the midpoint of the upper arm, the skinfold was pulled and the caliper was applied. Two measurements were taken. A third measurement was taken and the mean of the closest pair was recorded if there was a big difference between the first two.

Pregnancy outcome date, birth weight, length and head circumference were obtained during physical examination of the newborn infant by the midwife within 24 hours of delivery. Infants who were less than 2500 grams at birth were considered as infants with low birth weight.

In addition, a questionnaire covering the 24-hour diet recall was used and analyzed using Food Composition for Middle East to calculate nutrient intake.⁹ The food frequency consumption and dietary habits including cravings and aversion were

recorded. Also at the time of the interview, a small venous sample was obtained. Coulter Counter (Coulter T540) machine was used for hematological analysis. Pregnancy outcome data including infant's birth weight, recumbent height, and head circumference were obtained within the first 24 hours after delivery by trained medical staff at Prince Salaman Hospital.

Statistical analyses including Student T-test, Pearson's Correlation Chi-square, and Fisher's exact test were calculated as appropriate.

RESULTS

The mean age of the women was 28 ± 6.54 years with a range of 17-42 years. 11.4 percent of them were less than 20 years. The majority of the women (74.6%) got married below the age of 20 years. The mean age at marriage was 18 ± 3.39 . Fifty-six percent of the women and 32.5 percent of their husbands had a low level of education (illiterate, read and write). The majority of women (89.5%) were housewives and 10.5% of them had jobs outside the home.

The daily intake of different nutrients for pregnant women as well as their comparisons with the recommended dietary allowance (RDAs) /National Research Council (NRC) USA are shown in Table 1. More than 80% of pregnant Saudi women exceeded the RDAs in their intakes of protein (80.7%) and retinol (81.6%). Intakes of vitamin B1 (93.9%), calcium (82.5%), iron (98.2%) and energy (51.8%) were shown to be below the RDAs.

Table 1: Nutrient intake of pregnant women

Nutrient	Mean \pm SD	RD (%)
Protein (gm)	77.0 \pm 22.1	60 (128.0)
Fat (gm)	38.5 \pm 16.0	47 (82.0)
Carbohydrate (gm)	28.7 \pm 79.5	31.8 (90.0)
Energy (kcal)	1793.0 \pm 480.0	2504 (70.0)
Fiber (gm)	13.4 \pm 6.1	22.0 (61.0)
Calcium (mg)	802.1 \pm 349.6	1295 (62.0)
Phosphorous (mg)	1174.5 \pm 438.4	1298 (90.0)
Iron (mg)	11.5 \pm 5.0	30 (38.4)
Retinol (ug)	1445.4 \pm 671.6	1300 (111.0)
Vitamin B1 (mg)	0.7 \pm 0.5	1.6 (45.0)
Vitamin B2 (mg)	1.6 \pm 0.6	1.8 (86.1)
Vitamin C (mg)	91.3 \pm 66.2	70 (130.0)

Figure 1 shows the distribution of the women's intake according to the number of different choices in the diet from six food groups in a 24-hour period. Forty-five point six percent of the women had two servings of milk or milk

products, and only 1.8% had four servings to meet the recommended dietary allowances for milk and milk products. Thirty percent of the women had four servings of the meat group (lamb, beef, poultry and fish) meeting the recommended dietary allowances for animal protein, 23.7% had five or more servings and the rest (45.6%) had less than the recommended dietary allowances. The average daily intake in the present study is far from satisfactory in respect of milk, meat, and cereals. The present study revealed that women with specific cravings, pica and aversions were 28.1%, 13.2% and 47.4%, respectively.

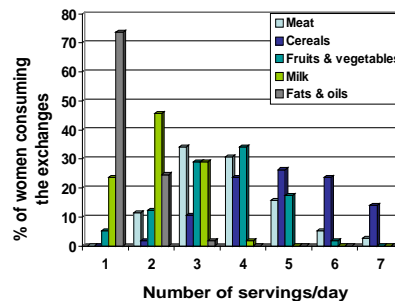


Figure 1: Food intake of pregnant women represented by food exchanges

The mean weight, height and mid-arm circumferences \pm SD were 70 ± 13.6 kg, 154.9 ± 6.0 cm and 25.3 ± 5.2 cm, respectively. Using the following criteria: height <140 cm and mid-arm circumference <23 cm as cut-off points, two point six percent of the women were at risk for malnutrition using the height criterion and 4.4% at risk using the mid-arm circumference criterion. Maternal anthropometric measurements were not significantly correlated with the pregnancy outcomes (birth weight and infant length) as shown in Table 2.

Using hemoglobin level, prevalence of anemia in the present study was 19%. However, 31%, 42% and 85% were below the cut-off levels¹⁰ for haematocrit, mean corpuscular volume and serum iron, respectively.

DISCUSSION

Women's nutritional status is closely tied to their reproductive capacity. Nutritional status influences age at menarche, fetal wastage, birth weight, women's ability to go through pregnancy, and nursing without compromising their own nutritional well-being and health status.¹¹

The relationship between early marriage and pregnancy outcome was examined. In the present

Table 2: Correlation – Maternal anthropometrics and pregnancy outcomes*

Maternal Anthropometrics	Mean±SD	R (value)			
		Birth weight		Length	
		R	P	R	P
Weight (kg)	70.4±13.6	0.1768	0.105	0.1327	0.177
Height (cm)	154.9±6.0	-0.0628	0.329	0.0836	0.280
Mid arm circumference (cm)	30.2±5.2	0.1505	0.143	0.1099	0.221
Triceps skinfold thickness (mm)	25.3±9.5	0.0924	0.257	0.0262	0.427
Body mass index	29.6±5.48	0.1944	0.084	0.940	0.256

study, women younger than 20 years of age represented 11.4% of participating mothers. They were at risk of having malnutrition and other health problems. Teenage girls in the East Mediterranean Region are markedly underweight with little adipose tissue and depleted muscle mass.¹² Furthermore, it was reported that this phenomena of high prevalence of adolescence pregnancy had resulted in increased risk of spontaneous abortion, a combination of fetal death and infant mortality, premature deliveries, low birth-weight, and fetal mal-presentation in Saudi Arabia.^{13,14} Notwithstanding tradition, teenage pregnancy should be discouraged.

In the present study, the diets of the pregnant mothers' were below the RDA for Vitamin B1 (93.9%), calcium (82.5%), iron (98.2%) and energy (51.8%). This profile revealed that the average nutrient intake was deficient in some of the important nutrients. Pregnant Saudi women in a comparable study⁵ had diets deficient in energy, vitamin B1, calcium, and iron. The low energy intake of pregnant women is a common problem in other parts of the world.¹⁵ In the present study, the mean intake of protein exceeded the RDA in 80.7% of mothers. Although the protein intake of the majority of mothers was sufficient, the calories were low. Therefore, the protein had to be used as a source of calories resulting in a diet inadequate of proteins.

In a recent study¹⁶ in the United States, it was reported that pregnant women enrolled in the Special Supplemental Program for Women, Infants, and Children (WIC) consumed only 85% of the RDA for energy. The most notable nutrient shortfall was iron; 90% of the women reported consuming less than 2/3 of the RDA.

In the present study, food consumption pattern was investigated by assessing the frequencies of food intake per day according to basic food groups, milk and milk products, meat group, fruits and vegetables, bread and cereals and fat and oil groups. The results revealed that

the women needed to improve their intake of milk, meat and the cereal group.

Diet during pregnancy is frequently considered a composite of local beliefs, traditions and practices relating reproduction. The present study revealed that the percentage of pregnant women with specific cravings for certain foods, pica and aversions was 28.1, 13.2 and 47.4, respectively. Differences in food cravings and aversions were possibly in response to beliefs about what should be consumed.¹⁷ In the present study, women craved mainly meat (25.9%). In the Sudan, 93% of pregnant women had various cravings.¹⁸ Twenty percent of Sudanese women believed that if not fulfilled, food cravings in pregnancy had a direct lasting effect on the child. A recent study showed that among 321 pregnant Saudi women, the percentage of cravings, pica and aversions were 38, 8.8 and 66.4 respectively.⁸

In the present study, the proportion of underweight women ranged from 2.6 to 4.4% using height and arm circumference indicators, respectively. Four different kinds of information may be related to height.¹⁹ Firstly, height may predict overall maternity body stores. Secondly, being short has been related to difficulties in labor and obstetric mortality. Thirdly, height may reflect socioeconomic status. Fourthly, maternal height is a phenotype expression of the genetic component. Specific maternal height cut-off points for a country or region need to be established for predicting risk of low birth infants. The assessment of nutritional status was complicated by the lack of pregnancy weight in the present study. Therefore, arm circumference was used as an indicator for nutritional status.

The results of this study showed no significant relationship between dietary intake and pregnancy outcomes, which is in agreement with observations made by many authors.^{20,21} Scholl et al (1991) suggested that there might be a direct relationship between maternal intake and birth-weight when maternal stores are low or depleted under conditions of frank poverty or famine.

Our findings about maternal anthropometric measurements were not significantly correlated with pregnancy outcomes. We found that 19% of the mothers were anemic. Iron deficiency anemia is believed to be a common health problem in the Arabian Gulf.²² Factors responsible for anemia in Saudi Arabia have not been investigated. It is possible that iron deficiency anemia is related to eating habits. In a recent report of the National Nutrition Survey, it was revealed that mothers increased their consumption of tea and coffee during pregnancy.⁷ This could affect their iron.

It is concluded from the findings of this study that pregnant women need to increase their intake of foods rich in iron, calcium, vitamin B1 and energy. The results suggest that pregnant women need guidance in selecting nutrient dense foods. Moreover, the results of this study emphasize the importance of nutritional profile of pregnant women, so that proper nutrition counseling and education could be given.

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