ORIGINAL ARTICLE

Role of Nutrition in Pregnancy and its effect on Fetal Birth weight

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ABSTRACT

Objective: To assess the role of nutritional diet including macro and micro nutrients during pregnancy and its effect on fetal birth weight so that appropriate nutritional strategies should be developed.
Design: cross sectional study
Setting: Chaudhry Rehmat Ali memorial trust teaching hospital Lahore.
Subject: 580 Primigravidae
Result: The incidence of low birth weight (<2.5kg) was higher (33%) among the primigravidae who were not taking nutritional supplement and their cereal based diet with very little pulses, vegetable and milk was poor, quantitatively and qualitatively in comparison with women taking supplement in which incidence was 4.6%.
Conclusion; nutritional supplement during pregnancy has great impact on health of mother and fetus especially on fetal weight.
Keywords: Nutrients, Importance of nutrients, micro nutrients, macro nutrients, primigravidae,

INTRODUCTION

Nutrients are basically defined as components of food. The demand for both energy and nutrients is increased during pregnancy[1, 3] because nutrients level in tissues and fluids available for evaluation and interpretation are normally altered by hormone-induced changes in metabolism, shifts in plasma volume and changes in renal function and patterns of urinary excretion in pregnancy. Nutrient concentrations in blood and plasma are often decreased because of expanding plasma volume, although total circulating quantities are greatly increased. Individual profiles vary widely, but in general, nutrients and metabolites are present in lower concentrations in pregnant than in non pregnant women. According to the US Food and Drug Administration (FDA), about 300 extra calories are needed daily to maintain a healthy pregnancy[2, 5]. These calories should come from a balanced diet of protein, fruits, vegetables, and whole grains with sweets and fats kept to a minimum. The American Dietetic Association (ADA) recommends the following key components of a healthy lifestyle during pregnancy: appropriate weight gain, consumption of a variety of foods in accordance with the Food Guide Pyramid, and appropriate and timely vitamin and mineral supplementation. Fluid intake is also an important part of healthy pregnancy nutrition. Women can take in enough fluids by drinking 6 to 8 glasses of water each day, in addition to the fluids in juices and soups. An expectant mother should talk with her physician about restricting her intake of caffeine and artificial sweeteners. All alcohol should be avoided in pregnancy[9].

Recent evidence suggests, however, that infants who are small or disproportionate at birth have increased health risks later in life[4,6]. The hypothesis is that such infants have had to adapt to a limited supply of nutrients and that in so doing their physiology and metabolism are permanently changed, although the rationale for this hypothesis has been challenged[7]. Requirements for all, micronutrients and macro nutrients increase during pregnancy. Deficiencies can exist because of losses or malabsorption associated with disease or inadequate intakes, lack of knowledge about adequate prenatal nutrition, or dietary taboos associated with pregnancy[8,] with potential adverse consequences for both mothers and newborn infants. Rush[9] notes that anemia in pregnancy and pregnancy-induced hypertension is common and thought to contribute significantly to maternal mortality and morbidity in developing countries[10]. Supplementation of diet with micro nutrients plays an important role .Vitamin A in the form of carotene reduces the risk of maternal mortality [11]as susceptibility to infection reduces; it has an additional advantage of increasing maternal Hb[12].

Zinc supplementation improves fetal weight[14]. In Bangladesh, zinc supplementation had no effect on birth weight but reduced the morbidity of low birth weight infants in first 6 months of life[15.]Vit D status of pregnant women should be of great concern even in industrialized countries such as United states and maternal supplementation of Vit. D reduces risk of

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poor fetal and infant skeletal growth and tooth mineralization. Little attention has been paid to potentially important issue of antioxidant nutrient supplement in pregnancy. Ascorbic acid and Vit. E inhibits free radical formation. a double blind randomized trial conducted in 283 women who had previous history of pregnancy induced hypertension resulted in 76% reduction in preeclampsia when 1000mg ascorbic acid and 400IU Vit. E was supplemented[19]. Adequate maternal iodine status is critically important[20]as its minor deficiency can affect fetal mental development. Macronutrients play an important role as they provide energy which is required for the growth and development of fetus, placenta and maternal tissues. The Food and Agriculture Organization/World Health Organization/United Nations University recommended that women should increase their energy intake by 85Kcal/day in the first trimester, 285Kcal/day in second trimester and 475Kcal/day in third trimester [13.]Macronutrients in the form of Carbohydrates, proteins and essential fatty acids in Omega-6 and Omega-3 are also nutritional determinant of gestational weight gain. A large proportion of the world's population who are low-SES at the household and/or population level subsist on diets based predominantly on cereals, which also serve as their main source of protein. Lysine, which is the primary limiting amino acid in most cereal proteins, is needed in greater quantities during gestation because of its critical role in protein synthesis[22.] This issue merits further exploration among pregnant women with cereal-based diets in low-SES populations, among whom the rates of low birth weight and IUGR are high. In many studies evaluating maternal protein intake and birth outcomes (though not all), investigators have described the SES characteristics of their samples, and the findings suggest that SES plays a mediating role in this association. The timing of the dietary assessment points to the importance of protein intake in the periconceptional and early pregnancy periods. Little or no attention has been given to cultural/environmental and life-cycle factors, and therefore these aspects warrant further study. The diet and body stores of essential polyunsaturated fatty acids in pregnant women need to meet the requirements of both mother and fetus, because the developing fetus depends upon maternal fatty acids and polyunsaturated fatty acids for its supply. The omega-6 and omega-3 fatty acid status of mothers has been found to decline during pregnancy, and while normalization occurs after delivery, it appears to take more than 6 months[23, 24.]

PATIENTS AND METHODS

Crossectional study was conducted at Chaudrey Rehmal Ali Memorial Trust Teaching Hospital.580 Primigravidae were randomly selected after 26 weeks gestation till delivery. Age of the patients varied from 20 to 32 years. Their BMI was in the range of 22-29Kg/$m^{2.}$ Women included were not suffering from any medical disorder and were having singleton pregnancy, no Congenital malformation, no H/o smoking or drug intake. Women suffering with hypertension, Diabetes Mellitus, chronic illnesses, multiple gestations, having BMI>30 and <18 were excluded. All 580 women were advised to take supplement in which macro and micro nutrients were present in recommended dose .300 women added the supplement in their diet while 280 women did not took any supplement and their diet was deficient because of poor socioeconomic background and they were consuming only 58%, 62%, and 31% of Recommended Dietary Allow (RDA) of carbohydrate, Protein and fat respectively. As the intake of mineral and vitamin was also less than half of RDA. Patients were follow-up in antenatal clinic and at each visit maternal weight gain and fetal growth were monitored on abdominal examination by fungal height measurement and ultrasonography. At the time of delivery irrespective of gender and mode of delivery either vaginal or caesarian route, fetal birth weight was taken.

RESULS

Among 580 primigravidae selected after 26 weeks gestation all were advised to take nutritional supplement in addition to diet ,300 women add nutritional supplement and 280 did not. In nutritional supplement women 260(87%) had regular Follow-up visits 40(13%) did not follow, 248(95%) delivered healthy babies with birth weight>2.5kg(2.5-4.0kg),12(4.6%) women delivered babies with birth weight <2.5kg. Women not taking nutritional supplement due to different reasons (table 2) in their diet.260(93%) patients came for antenatal follow up and 20(7%) did not came,174(70%) had babies with birth weight >2.5kg, 86(33%) women had babies with birth weight <2.5kg(1.4-2.4kg) .Reasons among women who did not take nutritional supplement were poor compliance in68(26%),11(4.2%) had no money,30(11%) and 70(26.7%)did not take due to sociocultural and religious norms, 30(11%) and 51(19.6%) women were not working and working as maids did not add supplement. From our cross sectional data analysis The incidence of low birth weight babies(33%) was higher among 280 less

nutritional in taker as compared to 260 out of 300 who were on nutritional diet in these it was only 4%.

Table 1:

Data	Women on nutrition supplement	Women not on nutrition supplement
No. of women	300/580	280/580
Follow up	260/300(87%)	260/280(93%)
Babies with birth weight>2.5kg	248/260(95%)	174/260(70%)
Low birth weight babies (weight <2.5kg)	12/260(4.6%)	86/260(33%)

Table 2: Reasons not to take nutritional supplement in women with low birth weight babies

Reasons	=n	%age
Poor compliance	68	68/260(26%)
Non availability of money	11	11/260(4.2%)
Socio cultural Norms	30	30/260(11.5%)
Religious norms	70	70/260(26.9%)
Occupation non working	30	30/260(11.5%)
Working	51	51/260(19.6%)

DISCUSSION

Ideally, macro and micronutrient deficiencies should be prevented or treated before a woman becomes pregnant. This improves not only maternal fertility and health but also improves fetal growth, development and weight gain. To maximize the reduction of low birth weight it is important to prevent maternal nutrient deficiencies in the periconceptional period, but majority of pregnancies are unplanned in Asia even in the United States and booking for antenatal care may be late. A reasonable approach would be the efficacy of giving multiple nutrient supplements once or twice a week to women during reproductive years and then possibly more frequently during pregnancy. The need for nutrient supplementation in pregnancy is likely to be great because of widespread preexisting malnutrition among females. Public health resources, however, are limited and it is inevitable that priority will be given to interventions that are both efficacious and effective. Current evidence shows that both macro and micronutrients, such as folate and iron and iodine, CHO, proteins, fats and energy, can reduce the risk of adverse pregnancy outcomes. Others, such as calcium, vitamin A, and zinc, may reduce the incidence of ill health and some life-threatening complications of pregnancy that are still common in many countries. Ideally, nutrient deficiencies should be prevented or treated before a woman becomes pregnant and till the end of pregnancy. This will improve fertility and maternal health. In this Study I have been notice that the successful birth with good fetal weight in nutritional dependent mothers and incidence of low birth weight increase on non nutrition dependent mothers.

CONCLUSION

Concern over the impact of nutritional role on the health of the mother and infant, seems to have big effect on fetal growth and birth weight. To reduce the incidence of low birth weight it is important to prevent mother nutrient deficiencies in the periconceptional period till the end of pregnancy. A theoretically reasonable approach to test would be the efficacy of giving multiple nutrient supplements once or twice a week to women capable of becoming pregnant and then possibly more frequently during pregnancy. Additional studies, however, are needed in different geographic regions to identify whether nutrient supplementation in pregnancy results in functional and measurable outcomes for maternal health and survival. These studies would enable the appropriate intervention strategies to be developed, implemented, and evaluated through primary health care system. Such efforts will require the collaboration and commitment of government agencies, health care providers, nutritionists, research institutions, and the community.

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