A Study of Nutritional Status of Saudi Pregnant Women Comparing with Non Saudi in King Abdul Aziz University Hospital in Jeddah

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Abstract: Pregnant women have been widely recognized as a vulnerable group from health point of view. They need more food than a normal person for the proper nourishment of the growing fetus. The field of nutrition of the pregnant women, especially in general hospitals, has been sadly. Methods: Against this backdrop, our study was carried out among 104 pregnant women Saudi and non- Saudi (86, 18, respectively) with second and third trimester attends to Obstetrics and Gynecology clinic at (KAUH). The goal of this study was to investigate the nutrient intake of pregnant woman and find factors affecting pregnancy outcomes such as weight gain, gestational age and prevalence of anemia as a compare between Saudi and non - Saudi pregnant women. A pre-tested structured interview schedule was used for the collection of general information. Twenty four hours recall method of diet was applied for the collection of dietary information. Hemoglobin and Hematocrit levels collected from a doctor's report for observing the anemic condition. Results: It was found that the energy intake was significantly different between Saudi and non-Saudi pregnant women at ($p< 0.05$). Also for protein, fat, and carbohydrate were significant difference between the two groups at ($p<0.05$). Regard to the differentiation of vitamin A, niacin and folat intake was highly significant at ($p<0.001$) between the two groups. However, the difference in vitamin D, riboflavin intake was highly significant at ($p<0.01$) while for vitamin C and thiamin intake were significant at ($p< 0.05$) between Saudi and non-Saudi Pregnant women. Pregnant women in their second and third trimester (Saudi and non-Saudi pregnant women) had a low dietary intake for most nutrients especially for nutrient crucial during pregnancy such as iron, folate, calcium, selenium, magnesium, and niacin; the difference between Saudi pregnant and non-Saudi pregnant women were highly significant. It was observed that mean daily dietary intake of iron and folic acid for the anemic pregnant were significantly lower than those of non anemic pregnant women. Also we observed that as trimester increase, the hemoglobin and hematocrit levels increases perhaps because a substantial proportion of pregnant women consumed iron and folic acid tablets or syrups regularly. Conclusion: This study highlights the need to develop programs to improve the dietary intake of non Saudi pregnant women which living in Kingdom Saudi Arabia. It is concluded from the findings of this study that pregnant women need to increase their intake of food rich in iron, folate, niacin, protein and energy. The results suggest that pregnant women need guidance in selecting nutrient dense food. The upraise for nutrition awareness programs among pregnant women is recommended. More emphasis should be given to the cheap, local, commonly consumed food that are nutrient rich so that these women are assisted in making the best use of their economic resources to improve their diet.
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1. Introduction

Maternal nutrition and health is considered as the most important regulator of human fetal growth. A healthy mother can produce a healthy child. If women are not well nourished, they are more likely to give birth to weak babies resulting in a high infant mortality rate. Pregnancy is the period of dynamic change for a mother requiring a lot of care. During this period the fetus is nourished directly by the mother through the placenta **(Subarnalata and Basumati ,2006)**.

Pregnancy is the most nutritionally demanding times of a woman's life. The body needs enough nutrients every day to support the growth of the baby and the maintenance of the mother's body. All the nourishment this developing baby need comes from mom, either through the food she eats or the supplements she takes. Pregnant women need more essential nutrients than other women. The body needs an additional 300 calories each day to support the growth of the baby. It is important to eat the right foods every day since tissues and organs develop during certain weeks of pregnancy and baby is always growing. Mom's health depends on diet, too. While the mother's body is supplying the nutrients the baby needs **(Jaime *et al.*, 2009).**

Poor nutrition can lead to a range of health problem for mothers including cardiovascular disease, diabetes, cancer, and overweight and obesity **(Li Ming et al, 2010**). Proper dietary balance is necessary to ensure sufficient energy intake for adequate growth of the fetus without drawing on mother's own tissues to maintain her pregnancy (**Mridula *et al.*, 2003**).

Without adequate nutrition during pregnancy, fetal growth and infant health are compromised. In general, consequences of malnutrition during pregnancy including fetal growth retardation, congenital malformation. Besides malnutrition, a variety of lifestyle factor and social demographic can adverse effect on pregnancy **(Sharon et al, 2006).**

In pregnancy anemia has a significant impact on the health of the fetus as well as that of the mother. It is the most widespread nutritional disorder in the world effecting 30 percent of the world's population. It is more common among the expectant mother (**Thangaleela and Vijayalaxmi, 1994**). In many developing countries, its prevalence is reported even as high as 75 % **(Ai-Guo *et al.*, 2009).** Some studies show that the prevalence of anemia during pregnancy is 10% to 20 % **(Jin *et al.*, 1995)**. Anemia during pregnancy has been attributed not only to increased iron requirements during the second and the third trimester of gestation, but also to micronutrient deficiency **(INACG, 1981).**

Poor nutrition, frequent labor, multiparty, abortions, parasitic infestations, consuming excess tea or coffee after meals determined as the predictors of anemia in reproductive age women. Studies well indicated the association of anemia with maternal morbidity and mortality **(Klaus and Michael, 2007**). The positive relationship between maternal nutrition and birth weight has been reported under acute starvation (**Gruenwald and Funakawa, 1967**) but less clear with moderate levels of malnutrition. (**Chase, 1969; Mate, and Urrutia, 1972; and McCance, and Widdowson, 1975)** In general, some studies have included dietary factors (**Philipps and Johnson,1977& Higgins , 2003)** and/or examine overall dietary quality as an independent variable (**Lechtig , *et al.*, 1975)** . Assessment of dietary intake during pregnancy is important because it is well established that both nutrient deficiencies and excesses can have adverse effects on pregnancy outcome **(Worthington, 1975).**

The purpose of this study was to investigate the nutrient intake of pregnant woman and find factors affecting pregnancy outcomes such as weight gain , gestational age and prevalence of anemia as a compare between Saudi and non Saudi pregnant women .

2. Subjects and Methods

Subjects:

This cross- sectional study was carried out among 104 pregnant women who come to randomly chosen from Obstetrics and Gynecology outpatient clinic in king Abdul-Aziz University Hospital (KAAUH) to be included in the study to represent Saudi and non-Saudi pregnant. The aim of the study was explained to the subjects. The mother's nationality was Saudi (82.7%) and non - Saudi (17.3%). Pregnant women 32.7 % (N=34) mothers at 2nd trimester and 67.3% (N= 70) mothers at 3rd trimester**.** The data collection was initiated in October 2009 and completed in January 2010.

Methods

Questioners:

A face-to-face interview was conducted with each participating mother by the students. The interview was of 20 to 30 minutes duration. The tool used for research was a personally designed questionnaire to collect the previous data; we met the pregnant women in KAUH Obstetrics and Gynecology Clinic individually during our regular follow up. In every meeting the participating mothers were asked about Socio-economic data (age, employment status, education level, type of family); Food habits of pregnant women, where the pregnant asked about (usual diet, snacks, supplements, caffeine intake, preferences. Nutritional status of pregnant women, which evaluated by using anthropometric measurements (weight, height, BMI before and after pregnancy), six days food intake and nutritional and healthy awareness. Mothers also reported their pre-pregnancy weight and height. Hemoglobin and hematocrit levels Health problems and her contact number (mobile or telephone number) to record the six days of food intake, also pregnant was given instruction about serving size.

Daily intake of nutrients:

In the study we met pregnant women in KAUH Obstetrics and Gynecology Clinic and asked them to fill the questionnaire then we educated the pregnant women about 7 day's dietary records method to record the food intake. We give the pregnant women 7 days dietary records and were asked to write every food, drink or snacks that she takes and the amount in units or parts then conformed these units or parts into grams to calculate the daily intake of different nutrients and by using food composition tables**.** (**National Nutrition Institute, 2006).**

Anthropometric measurements:

Weight (Wt):

The plate from scale was used to measure weight for pregnant women. The scale should be placed on a flat, hard surface. We should make sure that the scale is at zero before measuring pregnant women weight. The lady should stand in the middle of the scale's platform without touching anything and with the body weight equally distributed on both feet. The weight should be read to the nearest 100g (0.1Kg) and should be recorded. The lady should wear light clothes as possible. Weight was taken during the three trimesters of pregnancy**. (Robert, *et al.*, 2003).**

Height (Ht):

The pregnant woman was standing in front of the wall which is scaled by using the flexible non-stretchered fiberglass tape. The tape is put co-fluently over the head with her shoulder and buttocks pressed against the wall. The shoulder should be relaxed and arms at the side with feet on the bar, flat on the floor and heels close together and against the wall, the measure's eye level with headboard. The measurements are read to the nearest 0.1cm **(Robert, *et al.*, 2003).**

Body Mass Index (BMI):

This index was obtained by calculating Weight by Kg / square height by meter (Kg/m^2), and maternal BMI was then categorized as underweight <18.5 Kg/m^2), healthy weight (18.5-24.9 Kg/m^2), overweight (25-29.9 Kg/m^2), obesity (30-34.9 Kg/m^2), over obesity (35-39.9 Kg/m^2), and morbid obese (≥40 Kg/m^2). **(Jimmam *et al.*, 1998).** Weight-gain during pregnancy was calculated by subtracting the pre-pregnancy weight from the pregnancy weight in the second and third trimester. The pre-pregnancy BMI was calculated using the measured height and self reported pre-pregnancy weight.

Laboratory Investigations

Level of hemoglobin (HB) and hematocrit (HCT): The results were taken from records of KAUH Obstetrics and Gynecology Clinic files.

Ethical Considerations:

Permission was attained from the head of the department of Obstetrics and Gynecology in King Abdul-Aziz university hospital (KAUH).

Statistical Analysis:

The statistical analysis of data was conducted using SPSS Version 15; **(Arrmitage *et al.*, 2002; Betty, 2003;)**. The statistical differences among the two groups were analyzed by ANOVA, and when significant, they were verified through the Scheffe's test. The results presented are the mean with standard deviations. The Chi-square test was used to test the significance of the distribution rate within the groups and the results presented are the percentages. Results were considered significant if $p<0.05$.

3. Results:

General characteristics of the study population are shown in Table (1). The mean of the mother's age, family size, and husband's income were ascertained to be 28.08±5.54, 2.45± 1.003, and 4,207 ± 3,109 respectively. Most of the mothers (82.7%) were Saudi and the reaming (17.3%) were non-Saudi. The same table also showed the frequency distribution of study sample according to age; it was observed that 65.4. percent respondents belong to 20 and 29 years age group, followed by respondents of 30 -34years of (17.3) age group, while (15.4%) for 35 and above years of age , while (1.9%) were under 20 years of age.

On the basis of family size 22.1 percent a family size had less than 3 members , 26 percent had a family size up to three , while 36.5 percent had a family size between 4 and 6 members , and the rest (15.4%) were from large sized family having members 6 or above . The educational status revealed that only 1.9 per cent of mothers were illiterate, 28.8 per cent had a college education whereas the remaining had either high or middle school level education.

Respondents were divided into four groups according to the income of family per month. The majority of the respondent's monthly income were 3000 RS (39.4%) followed by (32.7%) earned 1000 to < 3000RS where 23.1 percent were earning 6000 RS and above per month , while the main Source of family income / RS was from husband's income were ascertained to be 89.4 percent as shown in table (1).

Table (2) shows that the majority percent distribution of weight before pregnancy was (73.6% and 61.4% respectively) in 2nd and 3rd trimester weighted 50- 69 kg, while fewer percent (11.8% and 10% respectively) in 2nd and 3rd trimester weighted <50kg; and 14.7percent and 28.6percent respectively in 2nd and 3rd trimester were weighted 70 to above 8o kg. Most of the pregnant women (44.1% and 48.1%) gained 5-9 kg respectively in 2nd and 3rd trimester, while (5.9 % &16. 3%) gained 10 -14 kg respectively in 2nd and 3rd trimester and (35.3 %) of pregnant gained <5 kg, , and 14.7 %&17. 3% of pregnant gained about 15-20 kg and above , respectively in 2nd and 3rd trimester were ascertained as shown in table (1).

The percent distribution of body mass index of women pre pregnancy ascertained in figure (1) 46.2 percent of the pregnancies were at normal weight prior to pregnancy, while (5.8%), (30.8%) and (17.2%) of pregnant were underweight, overweight, and obese, respectively.

Data presented in table (3) noticed that mean of energy and macronutrient intake of studied were different asterisks denote significantly different at ($p< 0.05$) between Saudi and non-Saudi pregnant women by1522. 79±595.52, 1170,57±450.14 for energy, 54.34±21.79, 42.78±13.46 for protein, 50.27±20.06, 37.95±10.77 for fat and 195.66 ± 77.99, 152.45±49.95 for carbohydrate respectively.

Table (1): Socioeconomic Status of Studied Sample of Pregnant women (N=104)

Variables			Pregnant		
Age in years (mean ± SD)			28.08±5.54		
Family size (mean ± SD)			2.45± 1.003		
Husband Income/RS (mean ± SD)			4207 ± 3109		
Characteristics	**No.**	**%**	**Characteristics**	**No.**	**%**
Nationality:			**Family size**		
Saudi Arabian	86	82.7	<3	23	22.1
Non Saudi Arabian	18	17.3	3-	27	26.0
			4-	38	36.5
			6+	16	15.4
Age groups:			**Pageant's Education**		
<20	2	1.9	Illiterate	2	1.9
20-24	25	24.0	Primary	4	3.8
25- 29	43	41.4	Middle	13	12.5
30- 34	18	17.3	Secondary	55	52.9
35and above	16	15.4	University	30	28.8
Working Pregnant			**Husband Income/RS**		
Yes	8	7.7	<1000	5	4.8
No	96	92.3	1000-	34	32.7
			3000-	41	39.4
			≥6000	24	23.1
Working Husband			**Family Income/RS**		
Yes	102	98.1	Husband	93	89.4
No	2	1.9	Husband + wife	8	7.7
			Relative	1	1.0
			Father	2	1.9

Table (2): Anthropometric measurements by trimester of Studied Sample of Pregnant women:

Characteristics	2nd trimester		3rd trimester	
Pregnancy Weight Before (Kg)	**No.**	**(%)**	**No.**	**(%)**
<5o	**4**	**11.8**	**7**	**10**
50 – 59	**11**	**32.4**	**25**	**35.7**
60 – 69	**14**	**41.2**	**18**	**25.7**
70 – 79	**2**	**5.9**	**10**	**14.3**
80 +	**3**	**8.8**	**10**	**14.3**
Pregnancy Weight gain (Kg)				
<5	**12**	**35.3**	**7**	**18.3**
5 – 9	**15**	**44.1**	**35**	**48.1**
10 – 14	**2**	**5.9**	**15**	**16.3**
15– 19	**4**	**11.8**	**9**	**12.5**
20 +	**1**	**2.9**	**4**	**4.8**

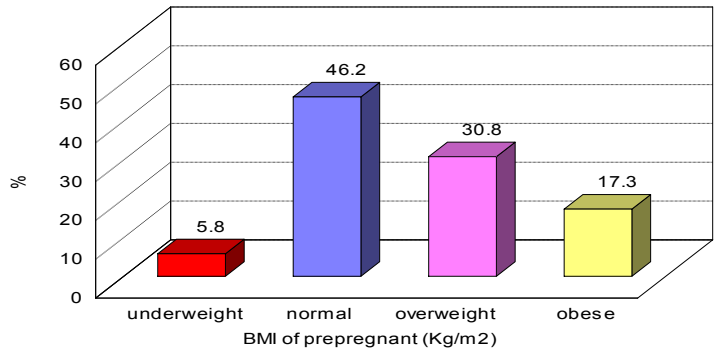

Figure (1): Percent Distribution of BMI of women prepregnancy (Kg/m^2).

Table (3): Mean ± SD of Energy and Macronutrients Intakes of Studied Subjects.

Variables / Nutrients	Saudi Arabian Mean ± SD	Non Saudi Arabian Mean ± SD	t. test	P
Energy (kcal)	1522.79 ±595. 52	1170.57 ± 450.14	2.36	0.020*
Protein(gm)	54.34 ± 21.79	42.78 ± 13.46	2.16	0.033*
Fat(gm)	50.27 ± 20.06	37.95 ± 10.77	2.525	0.013*
Carbohydrate(gm)	195.66 ±77.99	152.45±49.95	2.251	0.026*

This table (4) of vitamins and minerals intake of those studied indicated that mean for vitamin A, niacin and folate and calcium were highly significant at ($p<0.001$) by1077. 312±335.057and 648.40±164.65 of vitamin A; 14.07±4.08 and 9.72±1.07 of niacin; 501.72±95.389 and 380.95±54.51 of folate and 905.87±189.85 and 715.00 ±112.68 of calcium for Saudi and non-Saudi pregnant women respectively. Also, 5.55±3.35 and 3.01±1.96 for vitamin D; 1.8250 ±0. 91, 1.02 ±0. 63 for riboflavin; 867.43±253.99 and 694.54±176.54for phosphorus; 232.33± 42.95 and 201.22±42.52 for magnesium; 19.73±5.595 and 15.92 ± 3.829, 12 for iron, and12. 16±3.139 and 9.44 ± 1.844 for zinc, were highly significant at ($p<0.01$) for Saudi and non-Saudi pregnant women respectively. While vitamin C and thiamin were different asterisks denote a significant difference at ($p<0.05$) by 96.779±113.11 and 42.230±14.171, 1.755±0.831, 1.298±0.637 for Saudi and non-Saudi pregnant women respectively. But Selenium was not Significant by 50.651±12.91and 48.041±15.28 for Saudi and non-Saudi pregnant women respectively.

Table (5) shows Mean of Iron Intakes by Hemoglobin and Hematocrit Analysis of Studied Pregnant women. The mean± SD of the iron level by normal and anemic pregnant women was 19.94 ±5.87 and 17.66±4.59, respectively and the difference between the two groups was significant at $p<0.5$. While the Mean of the iron level for normal and anemic pregnant woman was 20.54 ±5.00 and 16.501±3.23 respectively and the difference between the two groups was highly significant at $p<0.001$.

Prepregnancy (Kg/m^2).

Figure (1) depicts the percent distribution of normal and anemic pregnant women by the percentage of Hemoglobin and Hematocrit of pregnant women. The majority of studied sample were normal (61.5%), while (38.5%) were anemic.

Table (6) indicates that the mean of biochemical analysis by nationality and by trimester of study pregnant women. The mean of hemoglobin was 11.633±1.3946 and 10.539±1.7177 for Saudi and non Saudi pregnant women respectively, and the differences between them were highly significant at $p<0.01$. Also 34.963±3.961 and 31.60±3.729 respectively for hematocrit in Saudi and non Saudi pregnant women, and the differences between the two groups were highly significant at $p<0.01$. While mean of biochemical analysis by trimester of this study were 10971±1.4696 and 11.673±1.478 respectively for hemoglobin level in the 2nd and the 3rd trimester , the difference between them was significant at $p<0.05$. As can be seen in the same table the mean of the hematocrit level in 2nd and 3rd trimester was 32.991± 4.2527and 35.0557±3.889, respectively, and the different asterisks between them denote significance at $p<0.05$.

Table (4): Vitamins and Minerals Intakes of Pregnant women by nationality (Mean ± SD)

Nutrients	Saudi Arabian Mean ±SD	Non Saudi Arabian Mean ±SD	t.value	P
Vitamins				
Vitamin A (mcg)	1077.312±335.057	648.407±164.650	5.284	0.000***
Vitamin D (mcg)	5.553.35	3.019±1.96	3.093	0.003**
Vitamin C (mg)	96.77±113.11	42.23± 14.17	2.035	0.044*
Thiamin (mg)	1.75±0.83	1.29±0.6367	2.193	0.031*
Riboflavin (mg)	1.82 ±0. 91	1.02 ±0. 63	3.509	0.001**
Niacin (mg)	14.07±4.08	9.72±1.0740	4.465	0.000***
Folate (mcg)	501.72±95.38	380.95±54.514	5.184	0.000***
Minerals				
Calcium (mg)	905.87 ±189. 85	715.00 ±112. 68	4.107	0.000***
Phosphorus (mg)	867.43±253.99	694.54±176.54	2.747	0.007**
Magnesium (mg)	232.33± 42.95	201.22±42.52	2.80	0.006**
Iron (mg)	19.73±5.595	15.92 ± 3.82	2.747	0.007**
Zinc (mg)	12.16±3.139	9.44 ± 1.84	3.539	0.001**
Selenium (mg)	50.65±12.91	48.041±15.28	0.755	0.452 (NS)

* Differences are significant at P<0.0 **Differences are highly significant at P<0.01

***Differences are highly significant at P<0.001 NS: Not Significant

Table (5): Iron Intakes by Hemoglobin and Hematocrit Analysis of Pregnant women (Mean ± SD)

Variables / Characteristics	Non - anemic Mean ± SD	Anemic Mean ± SD	t. Value	P
Hemoglobin Iron (mg)	19.94±5.87	17.66±4.59	2.089	0.039*
Hematocrit Iron (mg)	20.545 ±5. 00	16.50 ± 3.23	3.839	0.000***

* Differences are significant at P<0.05; ***Differences are highly significant at P<0.001

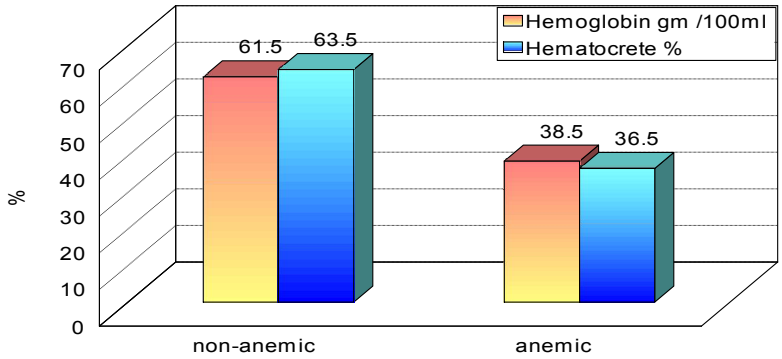

Figure (2): Percent Distribution of non- anemic and anemic pregnant women by Hemoglobin and Hematocrit percent

Table (6): Mean ± SD of Biochemical Analysis by Nationality and Trimester of Pregnant women

Variables / Biochemical Analysis	Saudi Arabian Mean ± SD	Non Saudi Arabian Mean ± SD	t. Value	P	2nd Trimester Mean ± SD	3rd Trimester Mean ± SD	t. Value	P
Hemoglobin	11.633±1.39	10.539±1.718	2.903	0.005**	10.971±1.46	11.673±1.478	2.277	0.025*
Hematocrit	34.963±3.961	31.60 ± 3.729	3.307	0.001**	32.991±4.25	35.0557±3. 88	2.462	0.015*

* Differences are significant at P<0.05; **Differences are highly significant at P<0.01

4. Discussion:

The Gestation represents a period of increased metabolic demands, and nutritional sufficiency is very important not only for outcome of pregnancy but also for the development of the fetus and the preservation of the pregnant reserves **(King, 2000, Rogers *et al.*, 1998).** There is a clear evidence to support the importance of optimal nutritional status in the prevention of both broad subgroups of low birth weight , small for gestational age births (which result from intrauterine growth retardation) and prematurity (which accounts for lower birth weight births in developing countries **(Caulfield, 1998, Bailey, 2000; Steer, 2000, Hess *et al.*, 2001, Green, 2002,).**

This cross sectional study was conducted with 104 mothers attending Obstetrics and Gynecology clinic at (KAUH). The mother's nationality was Saudi (82.7%) and non - Saudi (17.3%). Pregnant women 32.7 % (N=34) mothers at 2nd trimester and 67.3% (N= 70) mothers at 3rd trimester. This study has identified dietary patterns obtained from data collected by food frequency questionnaire from pregnant woman conducted in the second and third trimester. The goal of this study was investigated the nutrient intake of pregnant woman and find factors affecting pregnancy outcomes such as weight gain, gestational age and prevalence of anemia as a compare between Saudi and non - Saudi pregnant women.

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Sociodemogrophic profile:

In our study we found that one demographic characteristic and the number of family members affected gain weight .We thought that the greatest number of family members might increase maternal stress, as shown in table (1) which show that (15%) of pregnant women had a family size up to six members. It was observed that (37%) earned (1000 SR or less per month). Our study was agreement with a study conducted by **(Seo won and sang sun, 2009)** which found that one demographic characteristic and the number of family members affected birth weight. They thought that the greatest number of family members might increase maternal stress, but instead, it seems that pregnant women benefit from their family members' assistance**.** Also family economics and nutrition related problems need to be investigated in detail in such households to determine the contributing

effects of social structure and lifestyles on morbidity **(leyla *et al.*, 2010).**

Anthropometric Measurements:

One of the anthropometric measurements, pregnancy weight, affected birth weight. Weight-gain during pregnancy was calculated by subtracting the pre-pregnancy weight from the pregnancy weight in the second and third trimester. The pre-pregnancy BMI was calculated using the measured height and self reported pre-pregnancy weight. In most studies, being overweight is an important risk factor indicating possible pregnancy according to pregnancy outcome complications (**Galtier-Dereure and Boulot, 1994; Galtier-Dereure *et al.*, 2000**), the greater the weight gain, the greater the risks (**Kajantie, et, al, 2005**). Women who are underweight may also be at risk for adverse pregnancy outcomes (**Stewart *et al.*, 1987; Treasure, 1988; Conti *et al.*, 1998; Micali *et al.*, 2007)**. Thus, it is especially important to follow the weight gain recommendations. Pregnant women should seek counseling and extra support to ensure appropriate weight gain.

Our results as presented in table (2) revealed that the major percent distribution of weight before pregnancy was (73.6% and 61.4% respectively) in 2nd and 3rd trimester weighted 50- 69 kg, while few percent (11.8% and 10% respectively) in 2nd and 3rd trimester weighted <50kg; while (14.7% and 28.6% respectively) in the 2nd and 3rd trimester were weighted 70 to above 8o kg before pregnancy. Also our results represent the distribution of body mass index of women before pregnant ascertained in figure (1) 46.2 percent of the pregnancies were at normal weight prior to pregnancy, while (5.8%), (30.8%) and (17.2%) of pregnancies were underweight, overweight, and obese, respectively.

Energy and Macronutrients Intake:

An appropriate eating pattern is essential throughout the childbearing years and during pregnancy to ensure a healthy pregnancy and baby**, (Pick *et al.*, 2005).** In a country such as Saudi Arabia where food is easily available, nutritional status of woman during the course of pregnancy is expected to be compatible with those in other societies with similar standards of living **(Ahamd, 2007)**.

In our study the average energy and macronutrients intake of Saudi and non - Saudi pregnant woman of energy, were compared. All Saudi pregnant women included had a level of calorie intake more than another group of non-Saudi pregnant women. Mean ±SD of energy and macronutrient intake of studied were different asterisks denote significantly different at ($p< 0.05$) between Saudi and non-Saudi pregnant women as shown in table 3. A judicious combination of various food groups is required to ensure that nutrient demands of individuals are fully met. In interpreting the insufficient intake of nutrient in non - Saudi pregnant women, certain factors are worth mentioning. **First**, this study was carried out at a government hospital of which a larger percentage of deliveries are non-Saudi woman of low and middle socioeconomic levels. **Second**, the level of nutrition education among non Saudi pregnant women about their necessary requirements is inadequate; they lacked correct and adequate nutritional knowledge. Our study confirmed with the study by **(Ahmad, 2007).**

Micronutrients Intake

Regarding to the other nutrient intake (vitamins and minerals) of the respondents; our finding showed that the different intake between Saudi and non - Saudi pregnant women from vitamin A, Niacin, Folate, and Calcium were highly significant at ($p<0.001$). While the different intake of vitamin D, Riboflavin, Phosphorus, Magnesium, Iron and Zinc between Saudi and non - Saudi pregnant was significantly high at ($P<0.01$). It was also found that the mean daily dietary intake of iron i.e. **15.92 ± 3.829 (mg)** and folic acid i.e. **380.95±54.514 (mcg)** for non – Saudi pregnant women was significantly low as a compared to those of the Saudi pregnant women i.e., & **19.73±5.595** (mg) **for iron intake and 501.72±95.389 (mcg) for folate**. However the different intake among Saudi and non - Saudi pregnant women from vitamin C and Thiamin was different asterisks denote a significant difference at ($P <0.05$) as shown in table (4).

Nutritional Anemia:

The definition of *anemia* recommended by the Centers for Disease Control and Prevention is hemoglobin (Hgb) or hematocrit (Hct) value less than the fifth percentile of the distribution of Hgb or Hct in a healthy reference population based on the stage of pregnancy. A classification derived from an iron-supplemented population lists the following levels as anemic: Hgb (g/dL) and Hct (percentage) levels below 11 g/dL and 33%, respectively, in the first trimester; 10.5 g/dL and 32%, respectively, in the second trimester; and 11 g/dL and 33%, respectively, in the third trimester **(CDC, 1998).**

Our results represent Mean ± SD of level of iron intakes by Hemoglobin and Hematocrit Analysis of Studied Pregnant women in table (5). The mean± SD of the iron level by hemoglobin analysis for non-anemic and anemic pregnant women was 19.945±5.8744 (mg) and 17.663±4.5947 (mg) respectively and the difference between the two groups was significant at $p<0.5$. While the Mean ± SD of the iron level by hematocrit analysis for non - anemic and anemic pregnant woman was 20.5453±5.0058 and 16.501±3.2323 respectively and the difference between the two groups was highly significant at $p<0.001$. Our

results agreement with the study of **Subarnalata and Basumati, (2006)** which found that mean daily dietary intake of iron, of the anemic pregnant women were significantly lower than those of the non-anemic pregnant women. Since they consume sufficient quantities of dairy products, meats, fruits and vegetables

Our findings revealed that the prevalence of anemia was (38.5%) of the pregnant women as shown in figure (2). It was observed that mean daily dietary intake of iron for the anemic pregnant was significantly lower than those of non - anemic pregnant women as presented in table (5). Iron deficiency anemia is believed to be a common health problem in the Arabian Gulf **(Musaiger, 1987).** Our resulting agreement with other studies by **(Subarnalata and Basmati, 2006)** and **(Khalid Almurshed et al, 2007).** Thirty eight point half percent anemic pregnanant women in our study considered higher than other results of the study conducted by (**Leyla Karaoglu *et al.,* 2010**) in Malatya, which is an eastern Anatolian province with 800 000 inhabitants, which showed a moderate prevalence of anemia (27.1%). Even though our study showed 38.5 % prevalence anemic pregnant women , this is also higher than the prevalence's in European countries (25.1%) and in the Americas (24.1%) or averaging 18% in developed countries (**Allen, 1997**) and, **(WHO, 2008**). Therefore, it is necessary to continue anemia control programs. Anemia prevalence in our study was also higher than those reported from different parts of the country such as 29.4% in Afyon **(Bes, *et al.,* 2002).** Anemia prevalence in our study was lower than those reported by **Pirinçci *et al.,* 2001** from different parts of the country was 42.4% in Elaziğ provinces; the latter is in the eastern Anatolia near Malatya. Other studies report that high prevalence of anemia (66.67%) was observed in their study where as **Saxena *et al.* (2000) and Gautam *et al.* (2002)** observed incidence of 36.1% and 96.5% respectively in their study.

Biochemical Analysis by Nationality and Trimester of Pregnant women:

Data presented in table (6) indicates that the mean ± SD of biochemical analysis by nationality and by trimester of study pregnant women which revealed that the mean ± SD of hemoglobin content of the pregnant women in the blood was 11.633±1.3946 and 10.539±1.7177 for Saudi and non - Saudi pregnant women respectively, These results show that the differences between the two groups were highly significant at ($p<0.01$). The mean value of hemoglobin content in the blood of all pregnant women in the second trimester of pregnancy was below normal (<11 g/dL) but in the third trimester was normal. Our results agreement with the study of **(Subarnalata and Basmati , 2006)** which their results show that the mean hemoglobin content in the blood of all pregnant women in 2nd trimesters of pregnancy was below normal (<11g/dl) but in 3rd trimester it was normal, he observed that as trimester increases the hemoglobin level also increases**.**

In the same table the mean± SD of the hematocrit level in 2nd and 3rd trimester was 32.991± 4.2527and 35.0557±3.889, respectively, and the different asterisks between them denote significance at $p<0.05$.Such findings were largely confirmed by the normal results of the Biochemical laboratory serum blood tests performed. These results confirmed the report with researches made by **(Fujimori, *et al.,* 1999, Meier, *et al.,* 2003; Alevizos *et al.,* 2006)**.

Conclusion:

Pregnant women participating were in their second and third trimester (Saudi and non-Saudi pregnant women). They had a low dietary intake for most nutrients especially for nutrients crucial during pregnancy such as iron, float, calcium, selenium, magnesium, and niacin. The difference between Saudi and non-Saudi pregnant women was highly significant. It is concluded from the findings of this study that pregnant women need to increase their intake of food rich in iron, floats, niacin, protein and energy. These studies highlight the need to develop programs to improve the dietary intake, guidance in selecting nutrient rich foods by pregnant women in Saudi Arabia Kingdom. Emphasize the importance of the nutritional profile of pregnant women, so that proper nutrition counseling and education could be given by a clinical dietitian. The results also suggest that dietary intervention or education should be provided for pregnant women. More emphasis should be given to the cheap, local, commonly consumed food that are nutrient rich so that these women are assisted in making the best use of their economic resources to improve their diet. The upraise for nutrition awareness programs among pregnant women is recommended. Food preferences should be encouraged to accommodate suitable sources in term of adequate energy; macronutrient and micronutrient intakes

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