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A Study of the Effect of Dietary Intake on the Health Status of Pregnant Women

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ABSTRACT

Background: Pregnancy is a complex physiological process during which the woman's body undergoes significant adjustments in response to fetal demand, maternal nutrient supply, and hormonal changes. Maternal nutritional status plays a crucial role in shaping the developmental environment of the fetus, which consequently affects the birth weight of the newborn. **Aim of the study:** Assess the nutritional status of pregnant women, to examine the relationships between nutritional status and demographic characteristics of the pregnant women. The ultimate goal is to improve their lifestyle, food habits, and overall health. **Subjects and Methods:** Across-sectional descriptive study included 180 pregnant women in their second and third trimesters attending the Obstetrics and Gynecology clinic in ministry of health hospitals and health units in kufr Elsheikh Governorate. Data was collected using a food frequency questionnaire to identify their dietary patterns, and a 24-hour recall questionnaire to evaluate the actual daily intake of nutrients. **Results:** Nutrients significantly lower than the dietary reference intakes (DRIs) for most nutrients. However, the intake of zinc, vitamin A, vitamin C, thiamin, and riboflavin was satisfactory. The diet of all pregnant women was deficient in calcium. The mean intake of energy, protein, iron, and magnesium was satisfactory, but the mean intake of carbohydrate was significantly lower than the DRIs values. The weight gain during the second and third trimesters was in the normal range (0-28) kg. **Conclusion:** The study highlights the need for guidance in selecting a balanced and healthy diet during pregnancy to ensure optimal maternal and fetal health.

Keywords: Pregnancy, Nutrients, weight gain, calcium, second trimesters, third trimesters.

1. Introduction

Pregnancy is a dynamic physiological process whereby the woman's body undergoes significant adjustments, occurring in response to a rise in fetal demand, maternal nutrient supply and hormonal changes (Beringer *et al*. 2021). In the early days of pregnancy, a spongy structure known as the placenta develops in the uterus. Two associated structures also form. One is the amniotic sac, a fluid-filled balloon like structure that houses the developing fetus (Hofmeyr *et al.,* 2021).Weight gain during pregnancy is an essential element of fetal growth and fate of pregnancy (Getaneh *et al.* 2021). Adequate nutrition during pregnancy is important to enable the fetus to grow and develop physically and mentally to full its potential. It is widely believed that fetal nutrition plays a key role in the well-being of the newborn infant, and further influences health during childhood and adulthood, with possible effects for the next generation (Vural *et al.,* 2021).

2. Subjects and Methods

2.1. Study design and participants

A cross- sectional descriptive study, in which pregnant women attends to Obstetrics and Gynecology clinic in ministry of health hospitals and health units in kafrelsheikh Governorate.

2.2. Sample size

This study was conducted on 180 pregnant women included in the study according to Thompson and Steven, (2012) equation for the calculating of sample size.

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2.3. Data collection tools

Socio-demographic data is one of the most important determinants of the health and nutritional status of individuals so, the socioeconomic status was be evaluated by the valid and reliable socioeconomic status scale for health research in Egypt. The socioeconomic status was classified according to the quartiles of the score into low, middle and high levels (El-Gilany *et al.,* 2012).

2.4. Dietary intake assessment

Nutritional values of consumed food were calculated using a computer diet analysis program. The adequacy of diets was compared with Dietary Reference Intake (DRI). After 3 days of giving the Dietitian the questionnaires we went back to review the dietary food recalls (24 hours Recall) for the previous three days. Data of the 24-hour food intake was coded and enter into the program analysis. Results were compared with current Dietary Reference intakes (Kathleen and Escott-Stump, 2008). Data of the 24-hour food intake were coded; average of the three days was taken, and it entered into a computer program of food analysis. The analysis by this program based on food composition tables of Egyptian National Nutrition Research Institute (National Nutrition Institute, 2006). Then, percentage (%) of the mean daily intake of nutrients was calculated from the next formula:

$$\frac{\text{The mean daily intake of nutrients for each respondent}}{\text{The assigned dietary reference intakes (DRI) value}} \text{ x100}$$

Factors such as age and gender were considered when assigning Dietary Reference Intakes (DRI) values for each respondent (Meyers *et al.,* 2006).

2.5. Statistically analysis

SPSS statistical package for social science software, created by World Health Organization and Center for Disease Control and prevention Atlanta, Georgia, USA, version 25"2017" for statistical analysis.

3. Results

The study subjects were divided into two groups they were pregnant women in the second trimester and third trimester. The necessary statistical tests were conducted to compare between groups for Sociodemographic characteristics; number and pattern of meals and food frequencies and the statistical tests showed the following:

Table (1) presented studied pregnant females age ranged from (19 to 35) years old with a mean of (26.2 ± 4.9) years.

Socio-demographic characteristics presented also in table (1) for studied pregnant females. Most of the study participants were in low socioeconomic level (61.1%), while (17.8%) of middle level and (21.1%) were of high social status level.

Table (2) shows anthropometric assessment of studied pregnant females. Their current weight ranged from (45 to 125kg) with a mean ± SD of (77.2±13.2) with statistically significant difference (p=0.002). Their preconception weight ranged from (42 to 118kg) with a mean of (71.2±12.5) and their weight gain in pregnancy ranged from (0 to 28kg) with a mean of (6.1± 4.8) with statistically significant difference (p=0.000). Less than half of the study participants were overweight according to BMI categories (42.2%). While (32.2% and 2.2%) were in normal weight and underweight respectively according to BMI categories. Regard to the percent of obese, over and normal weight pregnant women were for second trimester (18.2%, 46.6% and 33%) and for third trimester (28.3%, 38% and 31.5%) respectively according to BMI categories.

Table 1: Sociodemographic characteristics of studied pregnant females (n=180).

Variables			Total participants (n=180)				Test of significance	P value
			Second Trimester (n=88)	Third Trimester (n=92)	Total (n=180)			
Age (in years)	Mean		27.0	25.4	26.2		Z=-1.906	0.057
	Std. Deviation		5.3	4.6	4.9			
	Minimum		19	19	19			
	Maximum		35	35	35			
	Percentiles	25	22.0	22.0	22.0			
		50	26.0	25.0	25.0			
		75	32.0	28.0	30.0			
Social status score (21-84)	Mean		49.9	51.6	50.76		Z=-1.016	0.309
	Std. Deviation		11.9	12.6	12.3			
	Minimum		22	22	22			
	Maximum		76	77	77			
	Percentiles	25	43.00	44.0	43.0			
		50	49.00	52.5	51.0			
		75	58.00	60.0	59.7			
			N	%	N	%	n	%	χ^2 =0.053	0.974
Social status level	Low		18	20.5	20	21.7	110	61.1		
	Middle		54	61.4	56	60.9	32	17.8		
	High		16	18.2	16	17.4	38	21.1		

Z=z score of Mann Whitney U test χ^2 = chi square test

Table 2: Anthropometric assessment of studied pregnant females (n=180)

Variables			Second Trimester (n=88)		Third Trimester (n=92)		Total (n=180)		Test of significance	P value
Height (cm)	Mean		162.8		162.2		162.5		Z=-.530	.596
	Std. Deviation		6.4		6.1		6.3			
	Minimum		150.0		150.0		150.0			
	Maximum		187.0		175.0		187.0			
	Percentiles	25	160.0		158.3		159.0			
		50	162.0		162.0		162.0			
		75	167.0		165.0		165.0			
Current weight (kg)	Mean		74.0		80.3		77.2		Z=-3.172	**0.002***
	Std. Deviation		12.5		13.2		13.2			
	Minimum		45.0		53.0		45.0			
	Maximum		110.0		125.0		125.0			
	Percentiles	25	68.0		72.0		70.0			
		50	73.5		78.0		75.0			
		75	81.5		90.0		85.0			
Pre pregnancy weight (kg)	Mean		70.1		72.2		71.2		Z=-.796	0.426
	Std. Deviation		11.9		12.9		12.5			
	Minimum		42.0		48.0		42.0			
	Maximum		103.0		118.0		118.0			
	Percentiles	25	65.0		64.0		64.0			
		50	69.5		69.3		69.3			
		75	77.1		82.0		80.0			
Weight gain during pregnancy (kg)	Mean		3.9		8.1		6.1		Z=-7.167	**0.000***
	Std. Deviation		3.7		4.9		4.8			
	Minimum		.0		1.0		.0			
	Maximum		25.0		28.0		28.0			
	Percentiles	25	2.0		5.6		3.0			
		50	3.0		7.0		6.0			
		75	5.8		9.8		7.4			
			n	%	n	%	n	%	χ^2 =2.767	0.429
BMI	Underweight		2	2.3	2	2.2	4	2.2		
	Normal		29	33.0	29	31.5	58	32.2		
	Overweight		41	46.6	35	38.0	76	42.2		
	Obese		16	18.2	26	28.3	42	23.3		

Z=z score of Mann Whitney U test χ^2 = chi square test BMI=Body Mass Index

Table (3) Most of the study participants were in third trimester (87%) were normal hemoglobin level and only (13%) were anemic; while in second trimester (69.3 % and 30.7%) were with normal hemoglobin and anemic hemoglobin status respectively with statistically significant difference (p=0.004). Also, the mean ± SD of hemoglobin in second and third trimester (10.8±0.9) and (10.5±0.7) respectively with statistically significant difference (p value = 0.002).

Table 3: Clinical and laboratory assessment of studied pregnant females (n=180)

Variables			Second Trimester (n=88)	Third Trimester (n=92)	Total (n=180)	Test of significance	P value
Systolic Blood Pressure (mmHg)	Mean		114.2	114.2	114.2	Z=-.682	0.495
	Std. Deviation		7.2	7.3	7.2		
	Minimum		90.0	100.0	90.0		
	Maximum		130.0	150.0	150.0		
	Percentiles	25	110.0	110.0	110.0		
		50	115.0	110.0	110.0		
		75	120.0	120.0	120.0		
Diastolic Blood Pressure (mmHg)	Mean		75.1	75.9	75.6	Z=-1.166	0.244
	Std. Deviation		5.4	6.0	5.7		
	Minimum		60	60	60		
	Maximum		80	90	90		
	Percentiles	25	70.0	70.0	70.0		
		50	80.0	80.0	80.0		
		75	80.0	80.0	80.0		
Blood sugar (mg/dl)	Mean		100.2	101.8	101.0	Z=-.766	0.444
	Std. Deviation		7.0	8.4	7.8		
	Minimum		80	85	80		
	Maximum		117	139	139		
	Percentiles	25	95.3	97.3	97.0		
		50	100.0	100.5	100.0		
		75	105.0	105.0	105.0		
Hemoglobin (g/dl)	Mean		10.8	10.5	10.7	Z=-3.152	**0.002***
	Std. Deviation		.9	.7	.9		
	Minimum		5.0	7.0	5.0		
	Maximum		13.2	12.0	13.2		
	Percentiles	25	10.3	10.2	10.2		
		50	11.0000	10.6	10.8		
		75	11.3000	11.0	11.0		
Hemoglobin status			N %	n %	n %	χ^2 =8.245	**0.004***
	Normal		61 69.3	80 87.0	141 78.3		
	Anemic (HB<11)		27 30.7	12 13.0	39 21.7		

Z=z score of Mann Whitney U test χ^2 = chi square test

Table (4) shows comparison between second and third trimester among studied pregnant females according to some variables. According to current weight in pregnancy, females in the third trimester had higher mean of weight (80.3±13.1 Kg) as compared to females in the second trimester (74±12.5 Kg) with statistically significant difference (p value= 0.001). Regard to weight gain during pregnancy, females in the third trimester had higher mean of weight gain (8.1±4.8kg) as compared to females in the second trimester (3.9±3.6kg) with statistically significant difference (p value = 0.000). And also, we can see the mean of hemoglobin in second and third trimester (10.8±0.9) and (10.4±0.7) respectively with statistically significant difference (p value= 0.002).

Table (5) shows (Mean ± SD) intake of nutrients among studied pregnant females. Their mean± SD intakes from energy; carbohydrates; Protein and fat were ;(619.1±163.7) (89.1±32.8); (24.5±6.5) and (18.3±6) respectively. However, their mean ± SD intakes from calcium; iron and zinc were (201.1±81.9); (4.6±1.3) and (3.2±0.9) respectively. Also, their mean ± SD intakes from vitamin A; vitamin C; thiamin and riboflavin were (153.7±298.1), (17.8±13.9), (0.2±0.1) and (0.3±0.2) respectively.

Table 4: Comparison between second and third trimester among studied pregnant females according to some variables (n=180).

Variables		Total participants (n=180) Second trimester(n=88)	Third trimester(n=92)	Test significance	P value
Current weight (Kg)	**Range**	45-110	53-125	t=-3.304	**0.001***
	Mean ± SD	74±12.5	80.3±13.1		
Height (cm)	**Range**	150-187	150-175	Z=-.530	0.596
	Mean ± SD	162.8±6.4	162.2±6.1		
	Median (IQR)	162(160-167)	162(158.3-165)		
Preconception weight (Kg)	**Range**	42-103	84-118	Z=-.796	0.426
	Mean ± SD	70.1±11.9	72.2±12.9		
	Median (IQR)	69.5(65-77.1)	69.3(64-82)		
BMI	**Range**	17.3-38.7	18.3-40.8	t=-1.085	0.279
	Mean ± SD	26.6±4.3	27.3±4.6		
Weight gain (Kg)	**Range**	0-25	1-28	Z=-7.167	**0.000***
	Mean ± SD	3.9±3.6	8.1±4.8		
	Median (IQR)	3(2-5.8)	7.(5.6-9.7)		
Social status score	**Range**	22-76	22-77	t=-.917	0.360
	Mean ± SD	49.9±11.8	51.6±12.6		
Systolic blood pressure (mmHg)	**Range**	90 /125	90 /150	Z=-.090	0.928
	Mean ± SD	113.9±6.5	114.4±7.8		
	Median (IQR)	110(110-120)	110(110-120)		
Diastolic blood pressure(mmHg)	**Range**	60-80	60-90	Z=-1.166	0.244
	Mean ± SD	75.1±5.3	75.9±6.0		
	Median (IQR)	80(70-80)	80(70-80)		
Blood sugar(mg/dl)	**Range**	80-117	85-139	Z=-.766	0.444
	Mean ± SD	100.2±7.0	101.8±8.3		
	Median (IQR)	100(95.3-105)	100.5(97.3-105)		
Hemoglobin (g/dl)	**Range**	5-113.2	7-12	Z=-3.152	**0.002***
	Mean ± SD	10.8±0.9	10.4±0.7		
	Median (IQR)	11(10.3-111.3)	10.6(10.2-11)		

SD=standard deviation IQR=Interquartile range t= student t test Z= z score of Mann Whitney U test

Table5:(Mean±SD) intake of nutrients among studied pregnant females (n=180)

Total participants (n=180)							
Nutrients	**Mean**	**Std. Deviation**	**Minimum**	**Maximum**	**Percentiles**		
					25	**50**	**75**
Energy(k.cal)	619.1	163.7	269.5	1462.7	503.7	613.2	712.9
Protein(gm)	24.5	6.5	9.1	63.5	20.4	24.1	28.2
Fat (gm)	18.3	6.0	6.1	36.5	13.9	17.4	22.1
Carbohydrate (gm)	89.1	32.8	26.7	222.8	67.8	81.7	104.2
Sodium (gm)	842.5	272.8	320.0	1673.6	660.3	797.5	978.8
Potassium (gm)	719.3	193.3	296.2	1968.4	598.5	710.5	836.3
Calcium (gm)	201.1	81.9	46.5	745.9	140.3	193.1	244.7
Phosphorus (gm)	322.9	90.1	128.7	917.9	270.1	317.6	365.1
Magnesium (mg)	30.5	13.0	5.2	86.6	20.1	28.7	39.9
Iron (mg)	4.6	1.3	1.6	12.2	3.7	4.5	5.3
Zinc (mg)	3.2	.9	1.5	8.3	2.7	3.1	3.7
Copper (mg)	.3	.1	.1	.6	.2	.3	.4
Vitamin – A (mg)	153.7	298.1	10.5	2072.4	48.2	69.1	102.5
Vitamin - C (ugRE)	17.8	13.9	1.9	103.6	8.8	14.7	22.1
Thiamin (mg)	0.2	0.1	0.1	0.6	0.2	0.3	0.4
Riboflavin (mg)	0.3	0.2	0.1	1.1	0.3	0.4	0.5

Table (6) illustrates number and pattern Consumption of meals among studied pregnant females. Its notice that most participants used to eat 3 main meals per day (92.2%), less than half of studied pregnant females consumed snacks once a day (41.70%), also less than half from them consumed low salt diet to some extent per day (44.4%), most of participates didn't consumed low protein diet per day (70%), more than half of studied pregnant females consumed low fat diet to some extent per day (65.60%) and also more than half of studied pregnant females were skipping meals or fasting (60.6%).

Table 6: Number and pattern Consumption of meals among studied pregnant females (n=180)

Variables	Total participants (n=180)	
	N	%
Number of main meals		
2 meals	14	7.8
3 meals	166	92.2
Number of snacks		
None	44	24.4
1	75	41.7
2	58	32.2
≥3	3	1.7
Consumption of low salt diet		
Yes	67	37.2
No	33	18.3
To some extent	80	44.4
Consumption of low protein diet		
Yes	18	10.0
No	126	70.0
To some extent	36	20.0
Consumption of low-fat diet		
Yes	40	22.2
No	22	12.2
To some extent	118	65.6
Fasting or skipping meals		
Yes	109	60.6
No	45	25.0
To some extent	26	14.4

Table (7) shows frequency of consumption of food groups and drinks among studied pregnant females. Most of the participants (95.6%) were found to consume Black bread daily. More than half of participants (57.8%) were consume rice, macaroni and pasta 2-3 times / week versus (40%, 1.1%, 0.6% and 0.6%) were found to consume it (daily, once a week, once twice a month and never ate it), respectively.

Table 7: Frequency of consumption of food groups and drinks among studied pregnant females (N=180)

Food groups	Daily		2-3 times/ week		Once/ week		1-2 times/ month		Rarely		Never	
	N	%	n	%	n	%	n	%	n	%	n	%
Grains												
Black bread	172	95.6	6	3.3	2	1.1	0	0.0	0	0.0	0	0.0
White bread	0	0.0	26	14.4	33	18.3	33	18.3	6	3.3	82	45.6
Rice/ Macaroni/Pasta	72	40.0	104	57.8	2	1.1	1	0.6	0	0.0	1	0.6
Meat group												
Boiled or grilled meat	1	0.6	17	9.4	49	27.2	73	40.6	6	3.3	34	18.9
Fried meat	1	0.6	15	8.3	48	26.7	71	39.4	5	2.8	40	22.3
Boiled or grilled chicken	2	1.2	22	12.2	146	81.1	8	4.4	0	0.0	2	1.1
Fried chicken	2	1.2	23	12.8	138	76.7	12	6.7	1	.6	4	2.2
Luncheon	3	1.7	17	9.4	29	16.1	17	9.4	5	2.8	109	60.6
Grilled fish	0	0.0	24	13.3	114	63.3	17	9.4	2	1.1	23	12.8
Fried fish	0	0.0	10	5.6	122	67.8	21	11.7	5	2.8	22	12.2
Liver/spleen and brain	1	0.6	7	3.9	10	5.6	41	22.8	81	45.0	40	22.3
Boiled eggs	32	17.8	56	31.1	51	28.3	3	1.7	1	0.6	37	20.6
Fried eggs	6	3.3	44	24.4	50	27.8		2.8	3	1.7	72	40.0
Drinks												
Tea	24	13.3	28	15.6	24	13.3	3	1.7	3	1.7	98	54.4
Coffee	3	1.7	4	2.2	2	1.1	4	2.2	5	2.8	162	90.0
Juices	10	5.6	26	14.4	31	17.2	45	25.0	2	1.1	66	36.7
soft drinks	0	0.0	7	3.9	35	19.4	20	11.1	11	6.1	107	59.4
Herbal drinks	1	0.6	6	3.3	15	8.3	14	7.8	5	2.8	139	77.2

About (40.6%) were found to consume boiled or grilled meat once twice a month versus (0.6%, 9.4%, 27.2%, 3.3% and 18.9%) consumed it (daily, 2-3 times per week, once weekly, rarely and never consumed it), respectively. Most of participants (81.1%) were found to consume boiled or grilled chicken once a week versus (1.2%, 12.2%, 4.4% and 1.1%) consumed it (daily, 2-3 times per week, once twice a month and never ate it), respectively. About half of all participants (54.4%) were found to never drink tea versus (13.3%, 15.6%, 13.3%, 1.7% and 1.7%) consumed it (daily, 2-3 times per week, once a week, once- twice a month and rarely), respectively. Almost all of participants (90%) were found to never drink coffee versus (1.7%, 2.2%, 1.1%, 2.2% and 2.8%) consumed it (daily, 2-3 times per week, once a week, once - twice a month and rarely), respectively.

4. Discussion

Nutritional status and dietary habits have an important impact on pregnant women. So, it was necessary to research this matter especially since the reason is due to not maintaining a healthy diet intake. This study was conducted at pregnant women in the second and third trimesters their age ranges from (19-35) years in Ministry of Health hospitals and health units in kafrelsheikh who showed willingness to participate in the study. The study aims to assess the nutritional status, identify nutrition-related health problems and find out the relationship between nutritional status and demographic characteristics of the pregnant to improve lifestyle as well as food and health habits.

Through the statistical results that we obtained from the study; we found the following:

Most of the study participants were of low socioeconomic level (61.1%), while (17.8%) of middle level and (21.1%) were of high social level and their age ranges from (19-35) years and this corresponds with Cena *et al*. (2021) where he found that Social, economic, and cultural factors have a significant and important impact on the health and safety of women during pregnancy and childbirth. It is necessary to consider these factors when providing health care to a pregnant woman.

Results show that weight gain in pregnancy ranged from (0 to 28kg) with a mean of (6.1± 4.8) with statistically significant difference (p=0.000) and this agree with Donangelo *et al.* (2016) where he found that approximately 5% of the total weight gain occurs during the first trimester of pregnancy and the remainder 95% is gradually gained at an average rate of about 0.45 kg per week during the second trimester and 0.40 kg per week during the third trimester. The average total weight gain in full-term healthy primigravida's is about 12 kg although the amount of weight gain varies widely among women. Our results also agree with Lumbanraja *et al.* (2013) where he found that Maternal weight gain increased its peak point at the second and third trimester with overall total weight gain ranged at 5 – 20 kg during pregnancy and this showed statistically significance difference with baby birth weight.

Our results show that most of the study participants were in third trimester (87%) with normal hemoglobin status; but (78.3%), (21.7%) were anemic hemoglobin status and (30.7%) were in second trimester with statistically significant difference (p=0.004) and also the mean of hemoglobin in second and third trimester (10.8±0.9) and (10.4±0.7) respectively with statistically significant difference (p value = 0.002) and this agree with Goicoechea *et al.* (2022) where he found that the mean Hb values were 13.1 g/dL in the first trimester, 11.5 in the second and 12 in the third.

Our results showed that most of participants consumed grains as black bread and rice / macaroni/ pasta (95.6% and 97.8%) respectively. And these results agree with Yonezawa *et al.* (2022) where found that grain consumption before and during pregnancy was positively associated with birth weight, also corresponds with Misan *et al.* (2019) where he found that a high consumption of wheat breadstuff among pregnant women.

In this study we found that less than half of participants (40.6%) were found to consume boiled or grilled meat and (67.8%) were found to consume fried fish once a week. This agrees with another study found that the frequency of meals was adequate for the most of pregnant women as well as recommended consumption of meat with poultry preference. However, inappropriate nutrition was also observed in a low consumption of fish and dairy products (Misan, *et al.,* 2019).

Our results show that about half of all participants (54.4%) were found to never drink tea and almost all of participants (90%) were found to never drink coffee and this agree with Li *et al.* (2015) where he found that caffeine consumption was associated with an increased risk of pregnancy loss. A dose–response analysis suggested that risk of pregnancy loss rose by 19% for every increase in caffeine intake of 150 mg/day and by 8% for every increase in coffee intake of two cups per day.

And correspond with Jahanfar *et al.,* (2015) where he found that during pregnancy, maternal clearance of caffeine slows down substantially and its half-life triples in the second and third trimesters, while the fetus has inadequate amounts of the enzyme needed to metabolize caffeine; and also in line with Bech *et al.* (2005) where he found that excess intakes of caffeine can promote vasoconstriction in uterine and placental circulations and increase fetal heart rate and arrhythmias, with potentially harmful effects on fetal growth and development.

Our results shows that mean energy intake ranged from (269.5) to (1462.7) with a mean ± SD of (619.1±163.7), protein intake ranged (9.1) to (63.5), DRI of fat ranged from (13.2% to 108.8%) with a mean of (42.4% ± 15.2%) and DRI of carbohydrates ranged from (11.5% to 178.7%) with a mean of (41.8% ± 18.5%) and this agree with Molina-Recio *et al.* (2022) where he found that pregnant women nutritional needs will be increased during a large part of pregnancy (especially in the second and third trimesters) and also found that it is generally recommended that, compared to her energy needs before pregnancy, they should be increased by(340 kcal/day) during the second trimester and by (452 kcal/day) in the third, concerning protein needs, an amount of (70–71 g) of proteins per day (which equals 1.1 g/kg/day) is considered to be adequate, making sure of the quality of the protein (with all its essential amino acids), about (30%–35%) of the total daily caloric intake should come from lipids and it is also advisable for carbohydrates to represent between (45% and 65%) of the total energy of the intake, which signifies around (175 g daily) (45 more than a nonpregnant woman).

Our results show that the mean ± SD of the iron intake for pregnant females in second and third trimesters were (4.66±1.43) and (4.66±1.19) respectively and this agree with Rogozińska *et al*. (2021) where he found that a normal pregnancy needs an additional iron, with the second trimester's highest needs.

Our results show that the pregnant women intake from zinc ranged from (1.5 to 8.3) mg and this correspond with (Mousa *et al.,* 2019) where he found that 82% of pregnant women have inadequate zinc intakes and that pregnant women consume ~9.6 mg/day of zinc during the second and third trimesters.

Our results show that mean intake from calcium ranged from (46.5 – 745.9) gm with a mean ± SD (201.1 ± 81.9) and this correspond with Grobler *et al.* (2016) where he found that increased calcium needs may therefore be met by diet alone (1.2 g/day recommended); however, supplementation of (0.3–2.0 g/day) is recommended by some to preserve maternal calcium balance and bone density and to support fetal development, particularly in women with low dietary calcium intake (<1 g/day).

Our results shows that vitamin A intake ranged from (10.5 to 2072.4mg) with a mean ± SD of (153.7±298.1), vitamin C intake ranged from (1.9 to 103.6ugRE) with a mean of (17.8±13.9), thiamin intake ranged from (0.1 to 0.6mg) with a mean of (0.2±0.1) and their riboflavin intake ranged from (0.1 to 1.1mg) with a mean of (0.3±0.2) and all these results agree with Halldorsson *et al.* (2021) where he found that vitamin A deficiency has an immunosuppressive effect and predisposes pregnant women to reproductive tract infections. Also, vitamin A deficiency during pregnancy can lead to fatal wastage, although high doses in early pregnancy can be teratogenic. Foods that contain vitamin A include liver, butter, eggs, carrot, and leafy greens. Also correspond with Parraguez *et al.* (2021)where said that vita mins C and E are very important in preventing oxidative stress (also known as antioxidant vitamins) associated with the pathogenesis of pre-eclampsia. Antioxidants safeguard the body from free radicals. Adequate intake of antioxidant vitamins is important throughout pregnancy. And also agree with Cochrane *et al*. (2022) where he said that vitamin B2 is a constituent of flavor enzymes required in energy metabolism as well as antioxidant functions. The RDA is 1.4 mg. Riboflavin deficiency has been implicated in preeclampsia. It can be found in some foods as liver, dairy products, meat, eggs, etc.

5. Conclusion

It is concluded from the findings of this study that pregnant women need to increase their intake of food rich in iron, calcium, carbohydrate, protein and energy. The results suggest that pregnant women need guidance in selecting nutrient dense food. Moreover, proper nutrition counseling and education could be given by clinical dietitians.

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