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Research Article

The Effects of Changes in Eating Attitudes and Behaviors Associated with Pregnancy on their Status of Meeting Nutrient Intake References

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Abstract

Background: This study aims to determine the effects of changes in nutritional behaviours of pregnant women due to pregnancy and their sociodemographic characteristics on their status of meeting nutrient recommendations.

Methods: This study was carried out with 656 pregnant women who were followed up in Family Health Centers affiliated to Public Health Directorate of Istanbul Province between February 20 and June 30, 2020. The questionnaire, which includes questions to evaluate nutritional behaviour and food consumption, was administered by face to face interview.

Results: It was determined that the average age of pregnant women was 28.8 ± 5.4 years and 26.7% were high school graduates and 68.6% were housewives. It was stated that 46.9% of pregnant women received information about nutrition during pregnancy. It was determined that as the education level increased, the consumption of snacks, adding to the diet compared to pre-pregnancy and the use of vitamins and minerals increased ($p < 0.05$). It was observed that 88.6% of the participants included foods rich in nutrients, mostly fruits, nuts and yoghurt between meals. The frequency of those below the estimated average requirement (EAR) value was highest in iron intake (98.4 - 100.0%), followed by folic acid (94.9 - 100.0%), vitamin B6 (66.7 - 93.5%), niacin (50.0 - 100.0%) and calcium (33.3 - 77.8%) intake, respectively.

Conclusion: Nutrient deficiencies are a common public health problem in pregnancy, therefore, pregnant women should be provided with nutrition and health education from reliable sources and the efficiency of nutrition consultancy should be increased.

Keywords: Pregnancy; Nutrition During Pregnancy; Food Selection; Eating Habits; Eating Behaviours

Introductıon

Nutrition during pregnancy is very important for mother and child health. During pregnancy, the need for nutrients increases both to meet the increase in maternal metabolism and to provide the energy and macro and micronutrients required for the fetus [1]. Due to malnutrition, severe protein and energy deficiency in preg-

nancy, low birth weight, preterm birth [2], poor perinatal survival [3], physical and cognitive disorders in childhood and metabolic disorders associated with nutrition in adulthood are observed [4-6]. In addition, this situation significantly increases the death risk of the baby [7-12].

Pregnancy is a period in which women are anxious about their nutrition [13] but have high motivation to improve their nutrition [14,15]. When the behavioural changes made by pregnant women to stay healthy and improve food intake were examined, it was determined that the most common health behaviour was "healthy eating" [16,17].

Personal arrangements for nutrition during pregnancy vary according to the sociodemographic characteristics of women. The data obtained from the studies show that with the increase in education level and age, pregnant women tend to make changes for a healthier diet [17-19]. In the study of Alves-Santos., *et al*. [2018], it was reported that older pregnant women reduced their processed food intake more than younger pregnant women [20].

Aim of the Study

The present study aimed to examine the sociodemographic characteristics of pregnant women in Istanbul and the effect of the change in eating attitudes and behaviours related to pregnancy on their nutritional requirements.

Methods

Sample size

This cross-sectional study was carried out with voluntary pregnant women who were followed up at 22 Family Health Centers (FHCs) affiliated to Public Health Directorate of Istanbul Province determined by lot between 20 February and 30 June 2020. Healthy pregnant women (n = 766), who were not diagnosed with a risky pregnancy, whose pregnancy was at or before 26 weeks, with a live and single fetus participated in the study, 110 pregnant women were excluded due to the lack of data and the study was completed with 656 pregnant women. The participants were informed about the study and their voluntary consents were obtained.

Study tools

Demographic data of pregnant women and their nutritional attitudes and behaviours related to pregnancy were obtained by using the questionnaire form, face to face interview method. Pre-pregnancy body weights were obtained from pregnancy follow-up files in FHCs. Pre-pregnancy Body Mass Index (BMI) = Body Weight (kg) / Height^2 (m^2) was calculated using the standard formula and evaluated according to the World Health Organization (WHO) classification [21].

Three-day food records were used to determine food consumption. Detailed information was given to the pregnant women beforehand to record the food consumption accurately and the food consumption amount was determined using the photographic food atlas. Energy and nutrient intakes were calculated using the BEBiS 8.1 nutrition program from food records. The data were compared with The Institute of Medicine Recommended Dietary Allowance (RDA) values, and Estimated Average Requirement (EAR) values that provides a more suitable comparison value for vitamin and mineral intakes and determine the prevalence of nutrient deficiency in the population [22,23].

Statistical analysis

Data were analyzed with SPSS 19.0 package program. Discrete data are given as a number (n) and percentage (%) distributions, while continuous data are shown as mean, standard deviation, median, lower and upper values. The compliance of the data to normal distribution was checked with the Kolmogorov-Smirnov test. The Mann-Whitney U test was used to compare two groups, and the Kruskal Wallis test was used to compare three or more groups. The Chi-Square (X^2) test was used to compare qualitative variables. A value of $p < 0.05$ was considered significant for all statistical data.

Ethics

The study was approved by the Clinical Research Ethics Committee of the S.B. Istanbul Medeniyet University (2013-KAEK-64) Institute of Medical Sciences and was registered (registration no.: 2020/0036).

Results

The ages of pregnant women with an average age of 29,0 ± 5,2 years vary between 17 - 43 years, and 33.5% of them were found to be between the ages of 25 - 29 years. It was found that most of the pregnant women (70.1%) were in the second trimester and 38.7% of them were in their first pregnancy. When pre-pregnancy BMI values were examined, it was found that 58.4% was normal and 24.7% was slightly obese. It has been determined that the fre-

quency of being primary and secondary school graduates is similar (22.4%, 21.5%, respectively), and pregnant women with high school or higher education constitute 44.8% of all pregnant women and the majority (69.2%)of them are working (Table 1).

Characteristics	n	%
Age (years)		
≤18	9	1.5
19-24	130	19.8
25-29	220	33.5
30-34	195	29.7
≥35	102	15.5
Education status		
Illiterate	12	1.8
Literate	62	9.5
Primary education	147	22.4
Secondary education	141	21.5
High school	184	28.0
College-University	110	16.8
Working status		
Non-working	202	30.8
Working	454	69.2
Pre-pregnancy BMI (kg/m^2)		
Underweight	39	5.9
Normal weight	383	58.4
Pre-obesity	162	24.7
Obesity class I	45	6.9
Obesity class II	21	3.2
Obesity class III	6	0.9
Pregnancy		
1st trimester	174	26.5
2nd trimester	460	70.1
3rd trimester	22	3.4
Number of pregnancies		
1	254	38.7
2	189	28.8
3	127	19.4
4	48	7.3
≥5	38	5.8

Table 1: Sociodemographic characteristics.

It was determined that most of the pregnant women did not skip meals (61.1 - 87.3%), and when the skipped meals were evaluated, lunch was skipped more frequently (38.9%) compared to other meals. Lack of appetite (25.5 - 48.8%), nausea (16.7 - 28.4%), not having enough time to eat (17.3 - 25.1%) were the most common causes of skipping meals (Table 2).

	Breakfast		Lunch		Dinner	
Frequencies and reasons for skipping meals	**n**	**%**	**n**	**%**	**n**	**%**
Meal frequency						
Always	551	84.0	401	61.1	573	87.3
Usually	73	11.1	108	16.5	49	7.5
Rarely	22	3.4	98	14.9	30	4.6
Never	10	1.5	49	7.5	4	0.6
Reason for skipping meals*						
Lack of appetite	47	44.8	64	25.5	27	33.4
Lack of time	21	20.0	63	25.1	14	17.3
Nausea	29	27.7	42	16.7	23	28.4
Lack of habit	9	8.6	66	26.3	5	6.2
Not to gain weight	0	0.0	2	0.8	6	7.4
Other	5	4.8	18	7.2	8	9.9

Table 2: Meal skipping status and distribution according to the reasons.

*: More than one option has been ticked.

It was observed that 77.4% of the pregnant women received vitamin-mineral supplements, respectively, the most multivitamin (36.8%), iron (31.9%) and folic acid (29.1%) were taken as supplements. In addition, it was determined that vitamin B12, vitamin D, calcium, magnesium and n-3 supplements were used. Depending on the pregnancy, 59.8% of them consume different foods in addition to their nutrition; and most milk-yoghurt (39.3%), fruit (31.9%), dried nuts (21.3%) and eggs (16.5%), respectively (Not shown in the table).

The status of meeting the recommendations of energy and nutrient intakes are given in table 3. The protein intake of pregnant women met 93.9% of the recommendations and their carbohydrate intake met 111.5%. While intakes of vitamin D, folic acid, vitamins

B1, B3, B6 and pantothenic acid were below the recommendations, it was determined that other vitamins were taken above the recommended. All mineral intakes except sodium, potassium and phosphorus were found to be below recommendations.

Nutrients	℘ ± SD	Min-Max	Meeting recommendations (%)
Energy (kkal)	1796.3 ± 506.5	493.7 - 5757.8	-
Protein (g)	66.7 ± 21.3	11.7 - 188.6	93.9
Protein (%)	15.3 ± 2.8	6.0-27.0	43.6-152.7
Essential amino acids (g)	31.1 ± 10.5	5.4-92.7	-
Carbohydrate (g)	195.0 ± 63.3	39.6-593.9	111.5
Carbohydrate (%)	44.4 ± 6.9	23.0-71.0	68.3-98.7
Fibre (g)	22.3 ± 7.9	3.3-71.2	79.6
Fat (g)	81.2 ± 26.1	14.1-289.7	-
Fat (%)	40.3 ± 6.3	18.01-60.0	115.1-201.4
Polyunsaturated fatty acids (g)	19.8 ± 8.9	2.4-92.9	-
Short chain fatty acids (g)	1.5 ± 0.7	0.01-5.3	-
Medium chain fatty acids (g)	1.2 ± 0.5	0.1-4.2	-
Long chain fatty acids (g)	71.8 ± 23.6	12.4-262.5	-
Cholesterol (mg)	292.9 ± 124.2	21.5-976.0	-
n-3 (g)	1.9 ± 0.9	0.3-7.5	140.8
n-6 (g)	17.7 ± 8.4	2.1-87.8	136.4
Vitamin A (µg)	1356.1 ± 1436.4	237.6-16406.7	176.1
Vitamin D (µg)	2.3 ± 3.8	0.0-38.3	15.3
Vitamin E (mg)	18.4 ± 8.3	1.7-89.8	122.8
Vitamin B1 (mg)	0.8 ± 0.3	0.1-2.5	59.1
Vitamin B2 (mg)	1.4 ± 0.5	0.4-4.4	101.9
Niacin (mg)	11.2 ± 4.6	1.9-36.6	62.0
Pantothenic acid (mg)	4.8 ± 1.7	0.7-12.8	80.6
Vitamin B6 (mg)	1.3 ± 0.4	0.3-4.3	70.4
Total folic acid (µg)	290.3 ± 89.1	55.2-772.2	48.4
Vitamin B12 (µg)	4.5 ± 5.1	0.2-57.1	174.5
Vitamin C (mg)	117.4 ± 61.2	6.5-465.7	138.1
Sodium (mg)	2053.6 ± 2206.9	353.6-51862.9	136.9
Potassium (mg)	2494.8 ± 810.5	595.8-7137.6	53.1
Calcium (mg)	795.6 ± 295.1	141.5-2164.3	79.6
Magnesium (mg)	274.4 ± 93.9	48.9-801.3	78.4
Phosphor (mg)	1134.3 ± 357.2	245.4-3213.9	162.0
Sulfur (mg)	736.9 ± 220.7	170.7-2083.3	-
Iron (mg)	11.2 ± 3.5	1.8-27.9	41.4
Zinc (mg)	10.2 ± 3.2	2.3-28.9	93.1
Iodine (µg)	78.6 ± 37.6	13.1-305.1	35.7
Chromium (µg)	0.0 ± 0.0	0.0-0.0	0
Caffeine (mg)	20.0 ± 30.8	0.0-238.1	-

Table 3: Nutrient intake and meeting status of recommendations.

The relationship between the status of meeting the recommendations of the pregnant women and their sociodemographic characteristics were evaluated. When nutrient intakes' status of meeting the recommendations were compared according to age groups, it was found that the percentage of calcium and phosphorus intake of meeting the recommendations in 30 - 34 age group was significantly higher than the 19 - 24 age group, and the iodine intake was significantly higher than the 19 - 24 age group of the pregnant women over the age of 35 ($p < 0.05$). Protein, fibre, vitamin B2, vitamin B6, vitamin B12, potassium, calcium, magnesium, phosphorus, iron, zinc and n-3 intakes were varied depending on the level of education ($p < 0.05$). It has been determined that as the education level increase, the percentages of the status of meeting the recommendations has increased. When the status of meeting the recommendations according to the BMI values before pregnancy is evaluated, it has been shown that the percentage of meet-

ing the protein recommendations of pregnant women with normal BMI is higher than the first-degree obese ones. It was determined that the percentage of vitamin B2, vitamin B12 and phosphorus meeting status increased as the degree of obesity increased ($p < 0.05$). It was found that the status of meeting the recommendations for protein, fibre, vitamin A, vitamin B1, vitamin B2, niacin, pantothenic acid, vitamin B6, folic acid, vitamin B12, potassium, calcium, magnesium, phosphorus, iron, zinc, iodine, n-3 and n-6 intakes in working pregnant women was higher than the non-working ones ($p < 0.05$). It was found that the percentages of the meeting of vitamin B12, calcium, magnesium and phosphorus recommendations were higher in those with a first pregnancy. It was determined that the percentage of the meeting of iodine recommendations of those with 5 or more pregnancies was higher than those with a second pregnancy ($p < 0.05$).

It was determined that 59.8% of the pregnant women increased their food intake and the percentage of meeting the recommendations of the nutrient intakes (except for vitamin D) of the pregnant women who increased their food intake was higher than those who did not increase their food intake ($p < 0.05$). It was found that 91.0% of the pregnant women had snacks and the percentage of meeting the recommendations of the nutrient intakes (except for carbohydrates, vitamin A, folic acid and sodium) of those who had snacks was higher than those who did not have snacks ($p < 0.05$) (Table 4).

Nutrients	Status of increasing nutrient intake		Z	p	Status of having snacks		Z	p
	Yes (n = 392)	No (n = 264)			Yes (n = 597)	No (n = 59)		
Protein (g)	358.57	283.85	-4.952	<0.001	334.76	265.19	-2.690	0.007
Carbohydrate (g)	342.38	307.89	-2.286	0.022	331.96	293.53	-1.486	0.137
Fibre (g)	352.35	291.70	-4.021	<0.001	333.33	274.17	-2.291	0.022
Vitamin A (µg)	356.40	287.08	-4.594	<0.001	328.40	329.52	-0.043	0.966
Vitamin D (µg)	339.95	311.50	-1.885	0.059	334.38	268.98	-2.529	0.011
Vitamin E (mg)	347.52	300.26	-3.132	0.002	338.02	232.13	-4.095	<0.001
Vitamin B1 (mg)	353.54	291.32	-4.124	<0.001	334.69	265.90	-2.660	0.008
Vitamin B2 (mg)	363.85	276.02	-5.821	<0.001	333.55	277.42	-2.170	0.030
Niacin (mg)	350.59	295.70	-3.637	<0.001	334.27	270.14	-2.479	0.013
Pantothenic acid (mg)	356.40	287.08	-4.594	<0.001	333.96	273.23	-2.348	0.019
Vitamin B6 (mg)	359.19	282.93	-5.054	<0.001	335.84	254.25	-3.155	0.002
Total folic acid (µg)	351.95	293.68	-3.862	<0.001	331.79	295.18	-1.416	0.157
Vitamin B12 (µg)	355.30	288.71	-4.413	<0.001	333.16	281.36	-2.003	0.045
Vitamin C (mg)	346.16	302.28	-2.908	0.004	334.38	269.03	-2.527	0.012
Sodium (mg)	347.62	300.11	-3.149	0.002	330.96	303.58	-1.059	0.290
Potassium (mg)	361.49	279.51	-5.433	<0.001	336.04	252.19	-3.242	0.001
Calcium (mg)	365.18	274.03	-6.041	<0.001	333.92	273.61	-2.332	0.020
Magnesium (mg)	359.17	282.96	-5.051	<0.001	333.93	273.51	-2.336	0.019
Phosphor (mg)	362.61	277.85	-5.618	<0.001	334.42	268.64	-2.543	0.011
Iron (mg)	356.99	286.20	-4.692	<0.001	332.72	285.84	-1.813	0.070
Zinc (mg)	354.67	289.64	-4.310	<0.001	333.84	274.50	-2.294	0.022
Iodine (µg)	350.43	295.94	-3.612	<0.001	335.28	259.85	-2.917	0.004
n-3 (g)	351.12	294.91	-3.725	<0.001	335.94	253.26	-3.197	0.001
n-6 (g)	348.43	298.91	-3.282	0.001	338.06	231.75	-4.110	<0.001

Table 4: Comparison of nutrient intake with increased nutrient intake.

$p < 0.05$.

When the status of having snacks was evaluated according to the working and the obtaining nutritional information statuses of the pregnant women, it was found that 95.0% of the working pregnant women consumed snacks, while the frequency of having snacks (89.2%) was lower in the non-working pregnant women ($p = 0.016$). Although 94.9% of those who obtained nutritional information consumed snacks, it was determined that the frequency of consuming snacks was lower (87.5%) in those who did not obtain nutritional information ($p = 0.001$). It was determined statistically significant difference between the situation of increasing and non-increasing food intake during pregnancy according to age group, education level, employment status, nutritional information and pre-pregnancy BMI values ($p < 0.05$). While the age group with the highest increase in food intake during pregnancy was 25 - 29 (66.4%), the age group with the lowest increase in food intake was under the age of 18 (22.2%) ($p = 0.003$). The group with the highest percentage of increasing food intake according to education level was college-university graduates (70.9%), while illiterate pregnant women (16.7%) had the least ($p < 0.001$). The frequency of increasing food intake in working pregnant women (71.8%) was higher than in non-working women (54.4%) ($p < 0.001$), the frequency of increasing their food intake in those who obtained nutritional information was found to be higher (63.8%) than those who did not (56.1%) ($p = 0.045$). According to pre-pregnancy BMI, underweight (64.1%) and normal (64.8%) women had a higher frequency to increase their food intake, while third-degree obese pregnant women were the group that had the least increase in their food intake (33.3%) ($p = 0.003$) (Table 5).

	Status of having snacks		**Status of increasing nutrient intake**	
	n	**%**	**n**	**%**
Age groups (years)				
≤ 18	9	88.9	2	22.2
19 - 24	112	86.2	72	55.4
25 - 29	203	92.3	146	66.4
30 - 34	184	94.4	122	62.6
≥ 35	90	88.2	50	49.0
	$X^2 = 7.855$		$X^2 = 15.828$	
	$p = 0.097$		$p = 0.003$	
Education status				
Illiterate	11	91.7	2	16.7
Literate	51	82.3	31	50.0
Primary education	130	88.4	65	44.2
Secondary education	129	91.5	89	63.1
High school	174	94.6	127	69.0
College-University	102	92.7	78	70.9
	$X^2 = 10.276$		$X^2 = 39.400$	
	$p = 0.068$		$p < 0.001$	
Working status				
Non-working	405	89.2	247	54.4
Working	192	95.0	145	71.8
	$X^2 = 5.830$		$X^2 = 17.554$	
	$p = 0.016$		$p < 0.001$	
Status of obtaining nutrition information				
Yes	296	94.9	199	63.8
No	301	87.5	193	56.1
	$X^2 = 10.863$		$X^2 = 4.010$	
	$p = 0.001$		$p = 0.045$	
Pre-pregnancy BMI (kg/m^2)				
Underweight	33	84.6	25	64.1
Normal weight	349	91.1	248	64.8
Pre-obesity	149	92.0	87	53.7
Obesity class I	43	95.6	24	53.3
Obesity class II	17	81.0	6	28.6
Obesity class III	6	100.0	2	33.3
	$X^2 = 6.462$		$X^2 = 17.755$	
	$p = 0.264$		$p = 0.003$	

Table 5: Distribution of having snacks and increasing nutrient intake according to sociodemographic factors.

Chi-square test.

$p < 0.05$.

According to table 5, it was determined that the intake of nutrients was generally below the EAR value. While the EAR value for niacin was 14 mg/day, it was observed that the median intake was below this value in all groups. Similarly, vitamin B6 (EAR=1.6 mg/day), folic acid (EAR=520 µg/day), magnesium (EAR=290 mg/day), iodine (EAR=160 µg/day) and iron (EAR= 22 mg/day) intakes

were found below the requirement in all groups. The frequency of those whose nutrient intake was below EAR value according to sociodemographic characteristics is given in table 6. According to age groups, the frequency of those whose intakes of niacin, B6, folic acid vitamins and magnesium, calcium, iodine and iron minerals were below EAR value (49.9-100.0%) was found to be high. According to niacin and vitamin B6 intakes, it was determined that the frequency of being below EAR value was high in literate pregnant women. Folic acid, iodine and iron intakes were found to be similarly high for those below EAR value at all education level groups. According to the working status, it was determined that the frequency of those whose nutrient intakes (except for folic acid and iron) were below EAR value was higher in those who did not work. The frequency of those with folic acid and iron intake below EAR value was found to be high and similar in both groups. Similarly, it was determined that the frequency of those whose intake of nutrients other than folic acid and iodine was below EAR value was higher in those who did not obtain nutritional information.

	Niacin (EAR=14 mg/day)		**Vitamin B6 (EAR=1.6 mg/day)**		**Folic acid (EAR=520 µg/gün)**		**Vitamin B12 (EAR=2.2 µg/day)**		**Calcium (EAR=800 mg/day)**	
	Nutrient intake	**Under EAR level**	**Nutrient intake**	**Under EAR level**	**Nutrient intake**	**Under EAR level**	**Nutrient intake**	**Under EAR level**	**Nutrient intake**	**Under EAR level**
	Median	**n (%)**	**Median**	**n (%)**	**Median**	**n (%)**	**Median**	**n (%)**	**Median**	**n (%)**
Age groups (years)										
≤18	11.3	9 (%100.0)	1.1	8 (%88.9)	247.1	9 (%100.0)	3.4	2 (%22.2)	503.4	7 (%77.8)
19-24	9.9	102 (%78.5)	1.2	100 (%76.9)	272.0	128 (%98.5)	3.7	29 (%22.3)	719.6	75 (%57.7)
25-29	10.7	178 (%80.9)	1.3	159 (%72.3)	281.2	213 (%96.8)	3.6	35 (%15.9)	762.7	121 (%55.0)
30-34	10.8	149 (%76.4)	1.3	150 (%76.9)	280.5	191 (%97.9)	3.6	29 (%14.9)	789.7	99 (%50.8)
≥35	10.2	81 (%79.4)	1.3	83 (%81.4)	277.1	101 (%99)	3.9	14 (%13.7)	810.9	50 (%49.0)
Education status										
Illiterate	10.8	8 (%66.7)	1.2	10 (%83.3)	262.4	12 (%100.0)	2.5	5 (%41.7)	720.6	9 (%75.0)
Literate	9.8	55 (%88.7)	1.2	58 (%93.5)	270.2	61 (%98.4)	3.5	14 (%22.6)	757.5	32 (%51.6)
Primary education	10.0	117 (%79.6)	1.2	113 (%76.9)	270.1	144 (%98.0)	3.2	26 (%17.7)	714.0	98 (%66.7)
Secondary education	10.9	110 (%78.0)	1.3	106 (%75.2)	288.4	136 (%96.5)	3.5	33 (%23.4)	793.8	72 (%51.1)
High school	10.7	142 (%77.2)	1.3	129 (%70.1)	281.1	182 (%98.9)	4.0	21 (%11.4)	811.4	89 (%48.4)
College-University	10.7	87 (%79.1)	1.3	84 (%76.4)	301.3	107 (%97.3)	3.8	10 (%9.1)	817.3	52 (%47.3)
Working status										
Working	11.3	151 (%75.1)	1.4	145 (%72.1)	291.3	197 (%98.0)	4.0	22 (%10.9)	851.7	90 (%44.8)
Non-working	10.2	367 (%80.8)	1.3	354 (%78.0)	274.5	444 (%97.8)	3.5	87 (%19.2)	752.5	261 (%57.5)
Status of obtaining nutrition education										
Yes	10.8	239 (%76.6)	1.4	229 (%73.4)	291.3	306 (%98.1)	3.9	48 (%15.4)	829.6	139 (%44.6)
No	10.3	280 (%81.4)	1.2	271 (%78.8)	272.2	336 (%97.7)	3.5	61 (%17.7)	744.5	213 (%61.9)

Pre-pregnancy BMI										
Underweight	10.1	28 (%71.8)	1.3	29 (%74.4)	305.0	37 (%94.9)	3.9	7 (%17.9)	843.0	15 (%38.5)
Normal weight	10.6	299 (%78.1)	1.3	289 (%75.5)	281.3	373 (%97.4)	3.8	58 (%15.1)	783.5	202 (%52.7)
Pre-obesity	10.6	133 (%82.1)	1.3	125 (%77.2)	277.3	160 (%98.8)	3.4	30 (%18.5)	750.7	93 (%57.4)
Obesity class I	10.0	36 (%80.0)	1.2	35 (%77.8)	254.9	45 (%100.0)	3.1	9 (%20.0)	691.4	26 (%57.8)
Obesity class II	9.9	20 (%95.2)	1.3	18 (%85.7)	244.8	21(%100.0)	3.4	5 (%23.8)	723.1	14 (%66.7)
Obesity class III	13.1	3 (%50.0)	1.2	4 (%66.7)	278.8	6 (%100.0)	5.7	0 (%0.0)	1083.7	2 (%33.3)

	Carbohydrate (EAR=135 g/day)		**Magnesium (EAR=290 mg/ day)**		**Phosphor (EAR=580 mg/ day)**		**Iodine (EAR=160 µg/day)**		**Iron (EAR=22 mg/day)**	
	Nutrient intake	Under EAR level	Nutrient intake	Under EAR level	Nutrient intake	Under EAR level	Nutrient intake	Under EAR level	Nutrient intake	Under EAR level
	Median	n (%)	Median	n (%)	Median	n (%)	Median	n (%)	Median	n (%)
Age groups (years)										
≤18	162.0	1 (%11.1)	193.9	6 (%66.7)	800.2	1 (%11.1)	55.4	9 (%100.0)	9.3	9 (%100.0)
19-24	193.8	23 (%17.7)	249.9	87 (%66.9)	1060.1	7 (%5.4)	65.1	128 (%98.5)	10.7	130 (%100.0)
25-29	191.1	25 (%11.4)	266.4	133 (%60.5)	1112.4	6 (%2.7)	75.2	209 (%95.0)	10.8	218 (%99.1)
30-34	187.7	29 (%14.9)	274.5	120 (%61.5)	1129.9	4 (%2.1)	73.3	193 (%99.0)	11.0	193 (%99.0)
≥35	184.8	21 (%20.6)	266.3	63 (%61.8)	1109.8	7 (%6.9)	80.8	96 (%94.1)	10.7	102 (%100.0)
Education status										
Illiterate	203.2	3 (%25.0)	230.1	7 (%58.3)	1043.5	1 (%8.3)	56.5	12 (%100.0)	10.1	12 (%100.0)
Literate	187.2	11 (%17.7)	240.0	48 (%77.4)	1088.1	4 (%6.5)	69.0	62 (%100.0)	10.1	61 (%98.4)
Primary education	184.9	25 (%17.0)	245.4	104 (%70.7)	1051.2	10 (%6.8)	70.3	143 (%97.3)	10.3	146 (%99.3)
Secondary education	195.5	17 (%12.1)	269.3	88 (%62.4)	1126.1	6 (%4.3)	77.3	137 (%97.2)	11.1	140 (%99.3)
High school	189.7	27 (%14.7)	280.3	98 (%53.3.)	1139.9	4 (%2.2)	75.3	172 (%93.5)	10.1	184 (%100.0)
College-University	186.8	16 (%14.5)	281.8	64 (%58.2)	1135.1	0 (%0.0)	71.5	109 (%99.1)	11.3	109. (%99.1)
Working status										
Working	185.1	30 (%14.9)	282.7	111 (%55.2)	1162.1	3 (%1.5)	78.3	191 (%95.0)	11.3	200 (%99.5)

Non-working	197.1	69 (%15.2)	251.9	297 (%65.4)	1074.3	22 (%4.8)	71.5	443 (%97.6)	10.5	451 (%99.3)
Status of obtaining nutrition education										
Yes	189.7	38 (%12.2)	277.3	178 (%57.1)	1153.5	7 (%2.2)	78.9	303 (%97.1)	11.1	309 (%99.0)
No	189.2	61 (%17.7)	250.6	231 (%67.2)	1060.2	18 (%5.2)	66.5	332 (%96.5)	10.5	343 (%99.7)
Pre-pregnancy BMI										
Underweight	214.4	3 (%7.7)	274.7	25 (%64.1)	1191.1	0 (%0.0)	77.9	39 (%100.0)	12.0	39 (%100.0)
Normal weight	190.1	51 (%13.3)	265.9	236 (%61.6)	1119.0	16 (%4.2)	73.0	369 (%96.3)	11.0	379 (%99.0)
Pre-obesity	187.6	30 (%18.5)	265.3	101 (%62.3)	1100.4	6 (%3.7)	71.1	157 (%96.9)	10.9	162 (%100.0)
Obesity class I	177.1	9 (%20)	277.5	26 (%57.8)	1064.0	3 (%6.7)	78.3	43 (%95.6)	10.0	45 (%100.0)
Obesity class II	183.8	5 (%23.8)	232.0	17 (%81.0)	1053.3	0 (%0.0)	58.7	21 (%100.0)	10.0	21 (%100.0)
Obesity class III	197.9	1 (%16.7)	263.0	4 (%66.7)	1284.5	0 (%0.0)	87.7	6 (%100.0)	11.2	6 (%100.0)

Table 6: The status of meeting nutrient recommendations according to sociodemographic characteristics.

Discussion

In this study, it was determined that the majority of pregnant women did not skip meals, took vitamin-mineral supplements, their intakes of vitamin D, folic acid, B1, B3, B6 vitamins and pantothenic acid were below the recommendations, and sociodemographic factors, nutritional attitudes and behaviours were effective in meeting their nutritional recommendations.

During pregnancy, correct eating habits, meal planning and timing are very important in ensuring adequate nutrient intake. Skipping some meals or long intervals between meals during pregnancy can lead to harmful effects for both the mother and the fetus. For this reason, it is recommended to consume three main meals as well as snacks during pregnancy [24]. Studies have reported that the most frequently skipped meal is lunch [25-27], and the most common reason for skipping meals is "waking up late" [25,27] and "unwillingness to eat" [27]. Similarly, in this study, it was stated that the most frequently skipped meal was lunch and the reasons for skipping were respectively lack of habit, appetite and time. In the studies conducted, it was observed that approximately 55% (54.5 - 58.0%) of the pregnant women had a snack [25,28], and in this study, the frequency of having a snack of pregnant women was higher (91.0%) than the other studies. During pregnancy, women may have increased their snacks due to their high motivation to change their nutritional habits and to think that they will not meet their increasing needs with main meals due to their care about the health of the fetus.

In a study, investigating the frequency of vitamin/mineral use in pregnant women, it was reported that 63% folate, 14% iron, 16% multivitamin and 1% calcium were used in the 1st trimester, while the use of iron supplements increased to 27% in the 3rd trimester [29]. According to the data of Turkey Nutrition and Health Survey (TNHS) 2010, it was reported that the most commonly used vitamin/mineral supplement in pregnancy in Turkey was iron with a rate of 43.5%, followed by the use of multivitamin/mineral (27.1%) and folic acid (15.1%). Supplements with a low frequency of use are vitamin D (5.7%), calcium (5.0%), and vitamin B12 (2.0%) [27]. In this study, it was determined that pregnant women mostly used multivitamins (36.8%), iron (31.9%) and

folic acid (29.1%). Despite the support program policies of vitamin D (1200 IU/day from the 2nd trimester) and iron (40 - 60 mg/day from the 2nd trimester) carried out by the Ministry of Health in our country, it has been observed that the frequency of use of vitamin D supplements is low, and the use of iron is not as frequent as desired (https://www.saglik.gov.tr/TR,11100/gebelerde-demir-destek-programi-uygulumasi-genelgesi-2007--6.html, https://www.saglik.gov.tr/TR,11158/gebelere-d-vitamini-destek-programi.html). Although iron supplementation is given by the Ministry of Health, the low use of supplements may be related to decreased patient compliance due to side effects and lack of awareness about the importance of iron use [30].

A maternal diet rich in nutrients during pregnancy is associated with improvement of fetal health, normal birth weight, and increased maternal and infant survival rates [31]. Macro and micronutrient requirements of pregnant women increase in this period. Accordingly, it is recommended that they meet the dietary reference values. In a study conducted in Canada, the average intake of vitamin A, thiamine, vitamin B6, calcium, magnesium and zinc of 1384 pregnant women was insufficient according to the EAR value, inadequate intake of iron (97.0%), vitamin D (96.0%) and folate (70.0%) were also determined. It has been reported that most pregnant women take sodium more than the daily upper limit value (3500 mg), and the average potassium intake is well below the adequate intake level (1500 mg) [32]. In this study, it was determined that while the percentage of folic acid, vitamin D, niacin, vitamin B1, vitamin B3, vitamin B6, pantothenic acid meeting the recommendations was low, other vitamins were taken above the recommended. In addition, it has been observed that the iron taken with food is insufficient. Inadequate intake of folic acid, which is a methyl donor required for DNA synthesis and cell division, causes neural tube defects [31]. Iron deficiency during pregnancy is also a nutritional problem that can lead to serious complications for both the mother and the fetus [33]. Vitamin D deficiency during pregnancy has been associated with the development of neurological disorders such as autism and language impairment in childhood. It has been found that there is a relationship between vitamin D deficiency in late pregnancy and impaired immune function and rickets in children [34]. To minimize these risks, all pregnant women are provided with iron and vitamin D support within the scope of the "Vitamin D Support Program for Pregnant Women" and "Iron Support Program for Pregnant Women". During pregnancy, high sodium and low potassium intake may lead to the development of hypertension [35]. In this study, high sodium (136.9%) and low potassium (53.1%) intakes of pregnant women were found. Accordingly, it was thought that the risk of hypertension might be high.

As a result of malnutrition during pregnancy, the nutritional elements required for the fetus are mostly obtained from the mother's body stores, so additional nutritional intake is recommended during pregnancy. In the study of Dibek (2007), it was reported that 63.4% of pregnant women increased their food intake during pregnancy, and the most added foods were fruit (89.6%), milk-yoghurt (78.0%) and cheese (42.2%), respectively [28]. In TNHS 2010, it was stated that during pregnancy, 49.8% of women increased their consumption of milk and dairy products, 66.3% of them increased their fruit/vegetables, and 30.9% of them increased their oilseed consumptions [27]. In another study, it was stated that 73.0% of the pregnant women met their additional energy needs by adding fruit and yoghurt, 60.1% by adding tuna sandwiches, 51.5% by adding walnuts and yoghurt [36]. In this study, it was determined that 59.8% of the pregnant women increased their food consumption, and the most added foods were milk-yoghurt (39.3%), fruit (31.9%), and nuts (21.3%), respectively. According to these findings, increasing milk and dairy products more was associated with pregnant women being more conscious about the importance of calcium intake.

According to a study conducted with 3528 participants in Europe, it was shown that adolescents consume half the recommended amount of fruits and vegetables and less than two-thirds of milk and dairy products, but they consume more meat and meat products, fat and sweets than recommended. It has been reported that sugary drinks, sugar-containing milk, low-fat milk and fruit juice provide high amounts of energy. Their saturated fatty acids and salt intakes are high, but polyunsaturated fatty acid intakes are low [37]. It can be thought that the low number of adolescent pregnant women who increase their food consumption may be due to the wrong eating habits of the people in this age group, irregular meal consumption and fast food diet [38]. In the study conducted by Lee., *et al*. (2014), it was stated that the energy intake of pregnant adolescents in the 2nd and 3rd trimesters met the recommendations [39]. In this study, although the requirements of the ≤ 18 age group were higher, it was seen that the group that increased the food intake the least according to the age.

Raising the awareness of pregnant and lactating mothers about nutrition affects the intake of foods that are potentially beneficial for both mother and baby. In a study, it was reported that the consumption of vegetables, fruit, and vegetable oil increased, while the consumption of fat decreased in the group in which nutritional information was given. Therefore, an increase in the intake of polyunsaturated fatty acids, dietary fibre, vitamin E, ascorbic acid, and folate in this group; and a decrease in saturated fatty acid intake was observed [40].

In the study of Murakami., *et al*. (2009), it was shown that as the education level of pregnant women increased, the frequency of addition to their nutrition increased. It has been reported that pregnant women with a high education level add vegetables, fish, and potatoes to their diets [41]. Similarly, in this study, two years college graduates were more likely to supplement their diet than those who were uneducated. Murakami (2009); emphasized that education has a strong effect on nutrition. He pointed out that food choices were based on the ability to understand nutritional recommendations rather than other socioeconomic factors [41].

In the study of Kerver., *et al*. (2006), the frequency of meals in adults; was found to be positively associated with carbohydrate, folic acid, vitamin C, calcium, magnesium, iron, potassium, and dietary fibre intakes. It is negatively associated with protein, total fat, cholesterol, and sodium intake [42]. Although this study depends on the content of the foods consumed at the meal, it can be said that the consumption of snacks affects the nutrient intake positively.

In the study of Giddens., *et al*. (2000); It has been shown that only 6% of pregnant women meet the 30 mg RDA level for iron and their average intake is 16.4 ± 6.2 mg. Although iron during pregnancy is absorbed more efficiently to support erythropoiesis, which is necessary for fetal growth and increased blood volume of the mother, it is not expected to meet the requirement of iron taken with food alone [43]. In this study, the fact that iron intake was below the EAR value shows that it is very difficult to meet the increasing iron need of pregnancy in our country with diet alone. Therefore supplementation of these minerals is supported as state policy. Adequate dietary calcium intake before and during early pregnancy is important in the prevention of eclampsia and preeclampsia pathologies. For this reason, it is critical for pregnant to emphasize the consumption of calcium-rich foods such as milk and dairy products [44]. In this study, it was detected that the intake of nutrients, in general, was below the EAR value.

In a study conducted in the United States, it was reported that intakes of energy, carbohydrate, fat, thiamine, riboflavin, niacin, folate, iron, zinc, and vitamins A, B6, and B12 were higher in adolescents compared to adults. The authors stated that they found contrary results in the study and attributed this to the adolescents' consumption of foods with low nutritional content and high energy density and stated that there was no difference between the groups when their nutrient intake was adjusted for energy [43]. In this study, it was found that the frequency of those consuming niacin, B6, folic acid vitamins and magnesium, calcium, iodine, and iron minerals below EAR value was higher in the group under the age of 18 compared to age groups.

In the study conducted by Liu., *et al*. (2015), a positive relationship was found between the education status of pregnant women and their folic acid intake. In addition, pre-pregnancy BMI; is negatively associated with energy, fat, vitamin C, and calcium intake [45]. In a study conducted with pregnants in Japan, it has been reported that the level of education has a positive association with protein, total n-3, and seafood-derived n-3 polyunsaturated fatty acids, fibre, cholesterol, potassium, calcium, magnesium, iron, vitamins A, D, E and C, and folate intake; and has a negative association with carbohydrate intake. It was stated that there was no relationship between total, saturated, monounsaturated, n-6 polyunsaturated fatty acids, alcohol and sodium intake and education [41]. In this study, according to niacin and vitamin B6 intake, the frequency of those below EAR value was higher in uneducated people; It was found that folic acid, iodine, and iron intake was below EAR value in all groups and the frequency of those who could not meet the needs increased as the education level decreased. It is thought that the ability to perceive food choices and dietary recommendations depends on education level rather than other socioeconomic factors such as occupation.

When evaluated according to working status, it was determined that housewives received more dietary fibre, magnesium, iron, vitamin A and folate than working women [41]. In a study conducted in Korea, it was observed that the frequency of meeting the energy needs of working and unemployed pregnant women was 83.7% and 96.3%, respectively. It was found that the protein, vitamin B2, niacin, vitamin C, calcium, phosphorus, potassium, and sodium in-

takes of unemployed women were significantly higher than those of working pregnant women. In addition, almost all of the women were reported to have intakes of iron (520 µg DFE/day) and folic acid (19 mg/day) below the EAR value [33]. Another study found that total energy and protein intake was higher in the non-working group than in the working group. Carbohydrate and fat intake were similar in both groups; It has been reported that intakes of vitamin B2, niacin, vitamin C, calcium, and potassium were lower in the working group [33]. Similarly, in this study, it was found that the frequency of intake of nutrients other than folic acid and iron below EAR value was higher in pregnant women who did not work. The frequency of those with folic acid and iron intake below EAR value was showed to be high and similar in both groups.

One of the limitations of the study is that supplements that are used, not added to nutrients taken. While calculating the nutritional intake of pregnancy, there is a need for studies that evaluate the amounts taken with foods and supplements together. Since the food consumption records of pregnant are based on their statements, it should be kept in mind that they may not reflect the actual intake.

Conclusion

The healthy nutritional status of a pregnant woman is an indicator of both personal and national well-being and development. To increase the nutritional knowledge level of pregnant women in the solution of nutritional problems, to correct their wrong eating behaviours, and to make them gain healthy eating habits, education should be given according to their economic, social, and cultural levels. Nutrition and health education to be given in schools is important in terms of providing the right behaviour gains for future mothers by ensuring that correct behaviour models are put into practice at an early age. To achieve this, long-term training programs and sample models should be used.

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