Artículo Original

Dietary Intake of pregnant women: A cross-sectional descriptive study

Ingesta dietética de mujeres embarazadas: Un estudio descriptivo transversal

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ABSTRACT

Introduction: *One of the most important stages of women's life which make several physiological and mental changes in women is pregnancy period. Based on the importance of nutrition in pregnancy period, having a healthy and suitable diet can ensure a secure pregnancy period and child birth; therefore, this study was done to determine the nutritional pattern of pregnant women who refer to health centers.* ***Methods:*** *The participants in this study were 235 pregnant women who referred to urban health centers and based on the age of pregnancy, they were passing the second trimester of pregnancy. The required information in this cross-sectional descriptive study were collected by the two sectional questionnaire which containing Food Frequency Questionnaire (FFQ) with 48 items and demographic characteristics questionnaire. The analysis of Food Frequency Questionnaire was done by NUT4 software and the analysis of data was done by SPSS software and statistic descriptive tests such as (affluence, average and standard deviation). To comparison the number of allowed using units of food groups of pregnant women in the second trimester of pregnancy with the average of the number of using units of food groups by population under study, the statistic T-test was used.* ***Results and Discussion:*** *The results of this study showed that 94.5% of pregnant women were using bread and cereals food group more than allowed range. The amount of using meat and protein food group, fruits group and fats group was in allowed range. The amount of using vegetables group and milk and dairy group was less than allowed range. About the amount of energy intake of food, the results of this study showed that 66.4% of participants in this study got more energy than allowed range.* ***Conclusions:*** *Pregnant women who participate in this study based on the intake of macronutrient and energy intake were in unappropriated situation, because of this, it is needed to give enough information about food groups and the needed amount of them in pregnancy period to all the pregnant women who refer to health centers*

Keywords: *Nutritional pattern; food intake; pregnant women. (**Fuente**: DeCS-BIREME).*

RESUMEN

Introducción: Una de las etapas más importantes de la vida de las mujeres que hacen varios cambios fisiológicos y mentales en las mujeres es el período de embarazo. Con base en la importancia de la nutrición en el período de embarazo, tener una dieta saludable y adecuada puede garantizar un período de embarazo y parto seguro; Por lo tanto, este estudio se realizó para determinar el patrón nutricional de las mujeres embarazadas que se refieren a los centros de salud.

Métodos: las participantes en este estudio fueron 235 mujeres embarazadas que remitieron a centros de salud urbanos y, según la edad del embarazo, estaban pasando el segundo trimestre del embarazo. La información requerida en este estudio descriptivo transversal se recolectó mediante el cuestionario de dos secciones que contiene el Cuestionario de frecuencia alimentaria (FFQ) con 48 ítems y un cuestionario de características demográficas. El análisis del Cuestionario de Frecuencia Alimentaria se realizó mediante el software NUT4 y el análisis de datos se realizó mediante el software SPSS y pruebas estadísticas descriptivas tales como (afluencia, desviación promedio y estándar). Para comparar el número permitido de unidades de grupos de alimentos de mujeres embarazadas en el segundo trimestre del embarazo con el promedio del número de unidades de grupos de alimentos por población en estudio, se utilizó

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la prueba estadística T. **Resultados y discusión**: Los resultados de este estudio mostraron que el 94.5% de las mujeres embarazadas estaban usando el grupo de alimentos de pan y cereales más del rango permitido. La cantidad de usar el grupo de alimentos de carne y proteína, el grupo de frutas y el grupo de grasas estaba en el rango permitido. La cantidad de uso del grupo de verduras y el grupo de leche y lácteos fue inferior al rango permitido. Acerca de la cantidad de consumo de energía de los alimentos, los resultados de este estudio mostraron que el 66.4% de los participantes en este estudio obtuvieron más energía que el rango permitido. Conclusiones: Las mujeres embarazadas que participan en este estudio basadas en la ingesta de macronutrientes e ingesta de energía no se apropiaron de esta situación, por lo que es necesario brindar suficiente información sobre los grupos de alimentos y la cantidad necesaria de ellas en el período de embarazo a todas las embarazadas. mujeres que remiten a centros de salud.

Palabras clave: Patrón nutricional; ingesta de alimentos; mujeres embarazadas (**Source:** *DeCS-BIREME*).

INTRODUCTION

Pregnancy is counted as one of the most important stages in women's life which causes several physiological and mental changes in women[1]. In pregnancy period, fetus grows fast and it needs to different kinds of nutrients to proliferate it cells and these nutrients should be prepared by suitable maternal nutrition[2]. Nutrition in pregnancy period has great importance because in addition to mother and embryo's health, affects the result of pregnancy[3]. The researches of World Health Organization Have shown that around 600,000 of pregnant women are died because of illnesses in pregnancy period and approximately 50% of all pregnant women all around the world are diagnosed with anemia, lack of calcium and vitamin A[4]. Therefore, suitable maternal nutrition in pregnancy, in addition to the complete growing up the embryo, prepares the necessary resources for lactation in the first six months after birth[5].

Some mothers avoid using foodstuffs even in enough sufficiency because of fearing of getting fat, while others, use foodstuffs more than their needs in pregnancy period which causes appearing high blood pressure, obesity, pregnancy diabetes, long delivery, preeclampsia and increasing prevalence of caesarean section[6-8]. Receiving less amounts of energy and protein in pregnancy is related to the low birth weight and preeclampsia or (pregnancy poisoning), while pregnancy diabetes is related to extra receiving of energy and oil and also receiving less amount of vitamins and minerals[9]. Unsuitable nutrition of mother in pregnancy period causes to increase the limitation of embryo growth to nine fold[10]. Maternal weighing during pregnancy, causes the baby getting bigger inside the uterus if it is more than normal, and if it is less than normal, it leads to preterm delivery, low birth weight for the gestational age and no breast feeding[11].

Due to the importance of nutrition in pregnancy, having a healthy and suitable diet can guarantee a secure pregnancy period and delivery; For this reason, evaluating the nutritional status of pregnant women and discovering nutritional problems during pregnancy and dealing with them is one of the priorities that the World Health Organization has given priority to pregnancy[12]. The first stage of nutritional care is a wide and complete assessment which is done by nutritionists and it is called the nutritional status assessment. This assessment provides information about clinical, nutritional, pharmacological, and anthropometric and biochemical characteristics of individuals that are helpful in determining nutritional support and medical nutrition therapy[13].

Food patterns form based on different factors such as culture, race, and many environmental factors such as food availability, food purchasing power and advertising[14]. Usually nutritional pattern in pregnancy period which prepare needs in this period consist of consuming milk, chicken and meat, fish and sunflower, eggs and legumes[15]. In the special food pyramid in pregnancy period, 9 units of bread and cereals, 5 units of fruits and vegetables, 2 units of meat and legumes, 3 units of dairy and 2 units of food groups are can considered[6].

So finally we can say that nutritional assessment helps to identify suitable foodstuff to use in pregnancy period, the suitable amount of foodstuff using in pregnancy period and even the number of using that food during day. Also gathered information about nutritional assessment can be used in nutritional counseling for pregnant women[16]. Due to the direct relationship between the nutritional pattern of pregnant women and their health and their fetus and also considering that the nutritional pattern of each region is derived from the culture of the same region and may differ with other areas, this study was done to determine the nutritional pattern in pregnant women who referred to Yasuj health centers.

METHODS

This study is a cross-sectional descriptive study in which the Cochran formula was used to determine the sample size. Samples were selected from all pregnant women who were in the second trimester of pregnancy (N=600) and had no specific disease or diet. The samples were selected because the relationship between maternal weight gain during pregnancy and fetal growth was

higher in the second trimester of pregnancy than in the first and third trimesters of pregnancy and showed maternal nutritional status clearer[10]; Therefore, by simple random sampling technique, 235 pregnant women who were in the second trimester of pregnancy or (14 to 28 weeks of pregnancy) were randomly selected from all pregnant women in each health center. Questioners collected the information by personal interviewing of 235 pregnant women referring to Yasuj health centers consist of (Shahid Sadooghi, Shahid Shafii, Shahid Dastgheib, Shahid Ashrafi Esfahani).

In this study, required information was collected by two sectional questionnaire consist of 48 items Food Frequency Questionnaire (FFQ) which its validity and stability is confirm in studies[17,18] and the demographic characteristics such as (age, level of education, the level of income, employment status, number of pregnancies and BMI).

FFQ contains some questions about the usage of different food groups such as bread and cereals, vegetables, fruit, milk and dairy, meat and high-calorie foods such as simple sugars and lipids that if one foodstuff is used, the amount of using it during the previous day, week, month and/or year is expressed. The maternal weight before pregnancy and mother's BMI was set down by using their health records and if the measurement of weight and height was needed, scale and meter were used. The number of recommended allowed unit in pregnancy period is for bread and cereal food group (7-11 units), vegetables (4-5 units), fruits (3-4 units), milk and dairy (3-4 units), meat and protein (2-3 units), lipids (20-35 %) and energy intake (2200-2400 kilocalories).

Analysis of FFQ by NUT4 software and analysis of data by SPSS software and statistic descriptive tests such as (affluence, average and standard deviation) were done. Also statistic T-test was use to compare the number of allowed unit of food groups for pregnant women in the second trimester of pregnancy with the average of the number of using units in food groups by the populations under study.

RESULTS

Results showed that the age range in 235 pregnant women who participated in this study has been between 19 to 42 years with the average of 28.3 and standard deviation of 6.15 (Table N°01). Based on the level of education, 37% of participants had universal degree, 34.5% of them had diploma, 23% of them had middle school and high school degree, 5.1% of them had elementary school degree and 0.4% of them were illiterate, based on the level of income 21.3% of participants had low income, 71.7% of them had average income and 7.7% of participants had high income. 88.5% of participants were housewife and just 11.5% of them were practitioner, 34.9% of participants were passing their first pregnancy, 41.7% of them were passing the second pregnancy, 16.6% of them were passing their third pregnancy and 6.8% of them were passing their fourth pregnancy or more than their fourth pregnancy (Table N°02).

The pre-pregnancy weight of participants was in the range of 40 to 98 kg with the average and standard deviation of 66.63 and 10.83 respectively and their current weight was in the range of 47 to 106 kg with the average and standard deviation of 75.06 and 11.25 respectively (Table N°01). The results of the BMI index of pregnant women for pre-pregnancy weight indicated that 3.4% of participants had BMI less than 18.5, less than half of participants (43%) had normal BMI (18.5 to 24.9), 42% of participants had BMI (25 to 29.9), 10.3% of participants had BMI (30 to 34.9), 0.9% of participants had BMI (35 to 39.9) and 0.4% of them had BMI 40 and more than 40 (Table N°03).

Table N°01. The average and standard deviation of variables of Age, Pre-pregnancy weight and current weight.

Variable	Average	Standard deviation
Age	28.3	6.15
Pre-pregnancy weight	66.63	10.83
Current weight	75.03	11.25

Table N°02. demographic characteristics of participants included: level of education, income level, employment status, number of pregnancies.

Level of Education	Percent	Frequency
universal degree	37	87
Diploma	34.5	81
middle school and high school	23	54
primary school	5.1	12
Illiterate	0.4	1
Total	100	235
Income level	Percent	Frequency
Low	21.3	50
Average	71.1	167
High	7.6	18
Total	100	235
Employment status	Percent	Frequency
Housewife	88.5	208
Practitioner	11.5	27
Total	100	235
Frequency of pregnancy	Percent	Frequency
First pregnancy	34.9	82
Second pregnancy	41.7	98
Third pregnancy	16.6	39
Fourth pregnancy or more	6.8	16
Total	100	235

Table N°03. Frequency and percentage of body mass index for pre-pregnancy weight.

BMI for pre-pregnancy weight	Percent	Frequency
less than 18.5 (Underweight)	3.4	8
18.5 to 24.9 (Normal range)	43	101
25-29.9 (Overweight)	42	99
30-34.9 (Obesity type one)	10.3	24
35-39.9 (Obesity type two)	0.9	2
40 and more than 40 (Obesity type three)	0.4	1
Total	100	235

In the study of nutritional intake of pregnant women participating in this study, the results about the usage of bread and cereals food group showed that only 3.4% of participants were using this food group in allowed range. The average number of using units from this food group by population under study was 20 units and the results of T-test showed a significant difference ($P < 0.05$). About meat and protein food group, 80% of participants were using of this food group in allowed range. The average number of using units of this food group by the population under study was 3 units that the results of T-test didn't show any significant difference ($P > 0.05$) (Table N°04).

The results about vegetables food group showed that 98.7% of participants were using less than allowed range of this food group, 0.9% of participants were using of this food group in allowed range and 0.4% of participants were using more than allowed range of this food group. The average of using units of this food group was 1 unit in people under study that the results of T-test showed significant difference for that ($P < 0.05$). About the using of fruits group, 10.2% of participants were using less than allowed range of this food group, 60.4% of participants were using in allowed range and 29.4% of participants were using more than allowed range. The average number of using units of this food group was 3 units in people under study that the results of T-test didn't show any significant difference ($P > 0.05$) (Table N°04).

About using fats and oils group, 7.6% of participants were using less than allowed range of this food group, 74.5% of participants were using in allowed range and 17.9% of participants were using more than allowed range of this food group. The average number of using units of this macronutrient in people under study was 28% that the results of T-test didn't show any significant difference ($P > 0.05$). About milk and dairy food group, the results of this study showed that 92.8% of participants were using less than allowed range of this food group. The average number of using units of this food group in people under study was 1.5 units that the results of T-test showed a significant difference ($P < 0.05$) (Table N°04).

About the amount of energy intake of diet, results showed that energy intake in 18.7% of participants were less than allowed range, in 14.9% of participants were in allowed range and in 66.4% of participants were more than allowed range. The average amount of energy intake was 2450 kilocalorie in people under study that the results of T-test didn't show any significant difference ($P > 0.05$) (Table N°04).

Table N°04. Status of intake of food groups and energy intake of participants.

Food groups	Cut of point	in allowed range	less than allowed range	more than allowed range	Significant
Bread and cereals	7-11 serving	3.4	2.1	94.5	$p < 0.05$
Meat and protein	2-3 serving	80	12.3	7.7	$p > 0.05$
vegetables	4-5 serving	0.9	98.7	0.4	$p < 0.05$
Fruits	3-4 serving	60.4	10.2	29.4	$p > 0.05$
Fats	20-35 %	74.5	7.6	17.9	$p > 0.05$
Milk and Dairy	3-4 serving	6.4	92.8	0.8	$p < 0.05$
Energy intake	2200-2400 kcal	14.9	18.7	66.4	$p > 0.05$

DISCUSSION

The goal of this descriptive cross-sectional study was the assessment of nutritional pattern in pregnant women that the results showed that the majority of pregnant women (94.5%), were using bread and cereals food group more than allowed range but the results of Abedini et al.'s study on the nutritional status of pregnant women showed that the amount of using This food group in pregnant women who participated in their study was less than allowed range and they were different from our results6 which may be the reason of this difference is the difference in geographical location and also the relish of these two population group.

About the usage of meat and protein group, the majority of pregnant women (80%), were using the meat and protein group in allowed range but the results of Farahaninia et al.'s study about nutritional pattern of pregnant women showed that using of meat and protein food group in pregnant women who participated in their study was less than allowed range[19]. Considering that the majority of families under study about the level of income were in average level, we can say that they didn't have any problem about providing meat and protein food group and this cause the usage of enough amounts of this food group by the majority of people under study.

The results of this study about the usage of vegetables group showed that most of pregnant women (98.7%) were using this food group less than allowed range and just 0.9% of pregnant women were using this food group in allowed range. The results of wen et al.'s study about nutritional habits during pregnancy showed that only very low number of pregnant women (7%) were using this food group in allowed range, but the results of Abedini et al.'s study was different from our study and it showed that the amount of using vegetables group, especially in the second trimester of pregnancy by the majority of pregnant women were more than allowed range[20,6]. unfamiliarity with benefits and nutrients in vegetables group and also lack of nutritional literacy about this food group can be one of the effective factors on inadequate using of vegetables food group in allowed range.

In this study, the rate of consumption of 60.4% of pregnant women from the fruits food group was at allowed range, while in trout et al.'s study the majority of pregnant women (more than 74%) in both intervention and comparison groups, were using fruits group at allowed range but the results of takimoto et al.'s study related to nutritional status of Japanese pregnant women showed that using of fruits food group by pregnant women was more than allowed rang compare to control group[21,22]. One of the reasons of using allowed amounts of fruits food group can easy availability to this food group noticing the geographical situation and special weather condition in this area.}

The majority of participants in current study (74.5%), were using fats and oils group at allowed range, but the results of Yang et al.'s study about nutritional intake of pregnant women in the northwest of China showed that the usage of fats and oils group in pregnant women were more than allowed range. The results of Myles et al.'s study about nutrition in black pregnant women showed that less than half of pregnant women (43.8%) were using the allowed amount of fats and 21.1% of them were using this food group more than allowed amount[23,24]. Nutritional habits can be effective in the amount of fats and oils group using because some populations desire to use barbecued foods and others like eating boiled or fried foods and this can be one of the effective factors about using fats and oils group.

The results of current study about using milk and dairy food group showed that using this food group in majority of pregnant women (92.8%) were less than allowed range and the results of this study were similar to the results of George et al.'s study about the nutritional choices of pregnant women[25]. Having allergies to lactose and the inability to tolerate lactose in the milk and dairy food group could be the reason for the reduction in consumption of this food group. On the other hand, race and geographical location also is one proved issue in tolerating the available lactose in milk and dairy food group which can affect the consumption of this food group among different populations.

The results of this study showed that the majority of pregnant women (66.4%) received more energy than allowed amount but the results of Naem et al.'s study about the zinc status and dietary intake of pregnant women showed that pregnant women participating in their study received less energy from their diet than allowed range so that, their total energy intake was only about 50% of total allowed amount. The results of Delvarianzadeh et al.'s study was also different than the results of our study and showed that average amount of energy intake by pregnant women in their study was less than allowed range[26,4]. The results of Abedini et al.'s study showed that only half of pregnant women (50%) had received energy from their diet in allowed range[27]. It seems that the difference in the amount of bread and cereals food group using which have more carbohydrate than other food groups, can be effective in the amount of receiving energy and its difference in different populations.

The results of the present study suggested that pregnant women participating in this study were in bad situation considering the amount of energy intake and macronutrients intake, because they consumed the majority of food groups more or less than allowed range. Because of this, it is needed to give enough information about food groups and the needed amount of them in pregnancy period to all the pregnant women who refer to health centers, because although the majority of pregnant women participating in this study are literate, but this literacy doesn't contain of nutritional literacy and it double the necessity of nutritional education to pregnant women with different level of education and income.

DECLARATIONS

Ethics approval and consent to participate:
This study was conducted after receiving the ethics code number (IR. YUMS. REC. 1396. 110) from Yasuj University of Medical Sciences Ethics Committee.
Availability of data and materials:

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

All data generated or analysed during this study are included in this published article.

Competing interests:
The authors declare that they have no competing interests.

Authors' contributions:
Jowshan M and Khazaie Y: Interview with pregnant

women and filling in the questionnaires.

EbrahimzadehKoor B and Karimpour F: Data analysis and collaboration in writing the article.

Salehi S and Pirouze M: Major cooperation in writing article and oversight.

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