ULTRAPROCESSED FOOD CONSUMPTION AND NUTRITIONAL PROFILE OF PREGNANT WOMEN DIET IN A MUNICIPALITY OF NORTHEAST BRAZIL

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ABSTRACT

Therefore, adequate nutrient availability and a balanced diet are essential. Objective: This study evaluated the food consumption of nutrients and fresh, minimally processed, processed, ultra-processed food by pregnant women attended by the Family Health Strategy (FHS) in the city of Picos-PI. Materials and Methods: Therefore, 50 pregnant women from 8 different FHS units were included. The assessment of food consumption was carried out by applying two 24-hour food recalls on alternate days. The recalls were analyzed based on different table composition and the foods were grouped according to the NOVA classification and the Food Guide for the Brazilian Population. Results and Discussion: The pregnant women evaluated were between 18 and 42 years old. The average caloric consumption were 11962 kcal / day, however it was identified inadequacies in consumption of carbohydrates, proteins, vitamin E, folate, calcium and iron. As for the food groups consumed, ultra-processed food presented expressive contribution, corresponding to 21,05% of the total average caloric consumption. Higher intake of lipids, saturated fat, thiamine, calcium and sodium was observed in the ultra-processed group. However, pregnant women who receive government aid consumed less ultra-processed foods. Conclusion: We concluded that pregnant women have an inadequate consumption of macronutrients and micronutrients during pregnancy, including significant consumption of ultra-processed foods that directly influence the higher intake of lipids, saturated fat and sodium.

Key words: Food consumption. Ultra-processed. Macronutrients. Micronutrients. Pregnant women.

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RESUMO

Consumo de alimentos ultraprocessados e perfil nutricional da alimentação de gestantes de um município do nordeste brasileiro

Portanto, a disponibilidade adequada de nutrientes e uma dieta balanceada são essenciais. Objetivo: Este estudo avaliou o consumo alimentar de nutrientes e alimentos in natura, minimamente processados, processados e ultraprocessados por gestantes atendidas pela Estratégia Saúde da Família no município de Picos-PI. Materiais e Métodos: Para tanto, foram incluídas 50 gestantes de 8 diferentes unidades da ESF. A avaliação do consumo alimentar foi realizada por meio da aplicação de dois recordatórios alimentares de 24 horas em dias alternados. Os recordatórios foram analisados com base em diferentes composições da mesa e os alimentos foram agrupados de acordo com a classificação NOVA e o Guia Alimentar para a População Brasileira. Resultados e Discussão: As gestantes avaliadas tinham entre 18 e 42 anos. O consumo calórico médio foi de 11.962 kcal/dia, porém identificou-se inadequações no consumo de carboidratos, proteínas, vitamina E, folato, cálcio e ferro. Quanto aos grupos de alimentos consumidos, os alimentos ultraprocessados apresentaram contribuição expressiva, correspondendo a 21,05% do consumo calórico médio total. Maior ingestão de lipídios, gordura saturada, tiamina, cálcio e sódio foi observada no grupo ultraprocessado. No entanto, as gestantes que recebem auxílio do governo consumiram menos alimentos ultraprocessados. Conclusão: Concluímos que as gestantes apresentam um consumo inadequado de macronutrientes e micronutrientes durante a gestação, incluindo consumo significativo de alimentos ultraprocessados que influenciam diretamente na maior ingestão de lipídios, gordura saturada e sódio.

Palavras-chave: Consumo alimentar. Ultraprocessado. Macronutrientes. Micronutrientes. Mulheres grávidas.

Revista Brasileira de Obesidade, Nutrição e Emagrecimento
São Paulo, v. 16. n. 105. p.1049-1059. Nov./Dez. 2022. ISSN 1981-9919 Versão Eletrônica
www.rbone.com.br

INTRODUCTION

During the gestational period, there is an increase in nutritional demand due to physiological adaptations in the maternal organism and fetal development.

Therefore, adequate nutrient availability and a balanced diet are essential (Bueno, Beserra e Weber, 2016) since reduced consumption of nutrients may cause competition between the mother and the fetus, reducing the availability of essential nutrients for the proper growth of the fetus (Moura e Azevedo, 2018).

There is evidence that the food consumption of pregnant women is insufficient in relation to essential nutrients, with an excess of foods with high calorie content and low nutritional quality, which are risk factors for overweight and obesity (Gomes e colaboradores, 2015; Araújo e colaboradores, 2016).

Ultra-processed foods have low nutritional content, high energy density and are rich in fat, sugar and salt. These characteristics make them hyper-palatable, resulting in decreased appetite regulation (Sartorelli e colaboradores, 2020).

Ultra-processed foods reduce the availability of essential micronutrients, especially iron, zinc and vitamin A, leading to nutritional problems that commonly affect children and pregnant women. A previous study shows that the increased consumption of ultra-processed foods, due to changes in their nutritional composition, is related to the onset of several chronic diseases, while daily consumption of fresh and minimally processed foods is related to disease prevention (Louzada e colaboradores, 2015).

Thus, pregnant women should consume a variety of foods, in adequate quality and quantity, taking into account individuality, the recommendations of national food guides, socioeconomic conditions and cultural aspects, in order to meet energy and nutritional needs and recommendations for Weight (Gomes e colaboradores, 2015).

Given the lack of publications dealing with food consumption in pregnant women, focusing on the type of food processing, the present study aims to assess the consumption of nutrients and fresh, minimally processed, processed, ultra-processed foods by pregnant women attended by Family Health Strategy (FHS) in the city of Picos-PI.

MATERIALS AND METHODS

This is a cross-sectional study, carried out with pregnant women attended at Family Health Strategy Units (FHS) in the city of Picos-PI, from August to December 2019.

Fifty pregnant women from eight ESF units chosen for convenience in distinct neighborhoods in the urban area of the municipality.

Women aged 18 years or over in any semester of pregnancy and who did not have intelectual, cognitive or physical disabilities were considered eligible. The study was previously approved by the Ethics and Research Committee of the Federal University of Piauí (UFPI) o CAAE: 19614119.0.0000.8057 (Number: 3.579.382). The subjects were recruited for convenience and previously informed of the research objectives for later inclusion by signing the Informed Consent Form (ICF).

The sample was characterized through a structured questionnaire, with variables of interest regarding education, income, and marital status. The assessment of food consumption occurred through the application of two 24-hour food recalls (R24h) on alternate days.

The first Recall of 24h was applied to 100% of the sample on the day of inclusion of each participant in the study and the second was applied by phone call to 40% of the sample according to Verly-Jr e colaboradoes, (2012) both recalls were applied without notice to avoid changing the participants' eating habits. In order to encourage the interviewees to remember the food consumed the day before the interview, the Multiple Pass Method by Moshefeght (Moshfegh e colaboradores, 2008) was used for reports of food consumption. Therefore, during the first recall, a specific form was used, with the aid of photographs of portions of food and kitchen utensils for better measurement of portions.

The recalls were analyzed based on different tables of food chemical composition, indicating total calories, consumption of carbohydrates, proteins, lipids, sodium, fibers, vitamins and minerals of the total food consumed. For processed foods that were not found in the tables, the nutritional information on their labels was considered.

The total energetic value of the diet (kcal / day), carbohydrate content (g / day), lipids (g / day), proteins (g / day), fibers and

overall assessment of vitamins and minerals were calculated using the Average Needs Estimated- EAR as a reference value contained in the Dietary Reference Intakes (DRI) (IOM, 2011).

To estimate the prevalence of nutrient inadequacy, the "EAR as a cutoff point" method was adopted, which corresponds to the proportion of individuals in the group whose consumption is below the EAR established for the nutrient (Beaton, 1964).

Foods were grouped according to the NOVA classification and the Food Guide for the Brazilian Population (Monteiro e colaboradores, 2016; Ministério da Saúde, 2014).

This classification considers the extent and purpose of food processing by dividing them into four groups, namely: 1- fresh or minimally processed foods; 2 - culinary ingredients; 3 - processed foods; and 4 - ultra-processed foods (Chart 1).

The percentage of energy contribution for each group was calculated in relation to the total energy value of the pregnant women's diet.

Chart 1 - Classification of food consumed by pregnant women attended in the prenatal care of the municipality of Picos-PI, based on the industrial food processing.

In natura or minimally processed: tapioca, cooked corn couscous, corn, popcorn, mush, mashed potato, whole milk, whole powdered milk, soup, rice, feijoada, carioca beans, green beans, baião (rice+beans), pasta with red sauce , pasta, macaroni, pirão (toasted cassava or maize flour mixture), chicken egg, chicken liver, chicken wing, chicken drumstick, chicken thigh, chicken breast, panelada, dried meat, goat meat, beef, ground beef, sun beef, lamb, broth beef, pork rib, beef liver, fish, vinaigrette, raw lettuce, raw cabbage, raw tomato, raw cucumber, cooked pumpkin, roasted cassava, sweet potato, cooked english potato, raw onion, cooked chayote , boiled beet, boiled carrot, coconut water, tamarind, strawberry, watermelon, grape, banana, apple, orange, melon, pear, guava, kiwi, plum, mango, umbu, cajá, avocado smoothie, cashew juice, acerola juice, guava juice, orange juice, passion fruit juice, mango juice, pineapple juice, chamomile tea.
Processed foods: pumpkin jam, dulce de leche, french bread, cheese bread, mozzarella cheese, rennet cheese, sardines, cracklings, canned corn, raisins.
Ultra-processed foods: chocolate truffle , mousse, chocolate milk, banana candy, pudding, pineapple cake, simple cake, chocolate cake, cassava cake, corn cake, fried cake, loaf of bread , hamburger bread, sweet bread, pepperoni pizza, strawberry yogurt, margarine, lasagna, chicken croquette, cheese pastry, chicken pastry, beef burger, pork sausage, french fries, powdered lemon juice, powdered passion fruit juice, canned pineapple juice, powdered orange juice, powdered orange juice, powdered strawberry juice, ham, smoked turkey breast, bologna, sausage, mayonnaise, ketchup, straw potato, cornstarch cookie, whole grain cookie, cream cracker cookie, mucilon, milk flour, popsicle, chocolate ice cream, guarana, orange fanta, coca cola, chocolate filled biscuit, noodles, chocolate milk box, panettone.

The data were tabulated in Microsoft Office Excel, and analyzed using the statistical software Stata (version 14).

Data on socioeconomic characterization and consumption were presented as percentages, means and standard deviation. Student's t-test was applied to compare the participants' mean consumption of macronutrients and micronutrients, according to the consumption of ultra-processed foods.

Therefore, the participants were stratified according to the average consumption of ultra-processed products. Person's chi-square test was applied to verify the association between socioeconomic variables and the consumption of ultra-processed foods. The statistical significance was $p<0.05$.

RESULTS

The pregnant women evaluated in this study were between 18 and 42 years old, with an average age of 25.8 years.

Most of the pregnant women were married or lived in a stable relationship (88%), (60%) lived with their partner and children, (68%) of the women had a family income ≤ 1 minimum wage (MW) and 58% of the sample is assisted by government aid. Regarding schooling, 17 (34%) have completed high school.

The average caloric consumption was 1962 kcal / day and inadequacies were found regarding consumption (% kcal) of carbohydrates and protein. An average consumption (g) less than the recommendation

for omega 6 and fibers was observed. Regarding the average consumption of vitamins and minerals, Vitamin E, Folate, Calcium and Iron, all micronutrients were below the recommendation for pregnant women, with an inadequacy percentage of 100%, 93.88%, 75.6% and 97, 96% respectively (Table 1).

A higher intake of lipids, saturated fat, thiamine, calcium and sodium was observed in the group of pregnant women who consumed ultra-processed foods above the average (UPF ≥ 21.05%) (p <0.05). There was no significant difference between the two groups for other nutrients (Table 2).

Table 1 Total caloric intake, macronutrients, fats (saturated, monounsaturated, polyunsaturated, omega - 6 and omega - 3), fiber, vitamins and minerals of pregnant women attended in the prenatal care of the municipality of Picos-PI from August to December 2019.

	Energy (Kcal)	CHO (g)	CHO (% Kcal)	PTN (g)	PTN (% Kcal)	LIP (g)	LIP (% Kcal)
Mean±SD	1962.012 ±593.7439	250,25 ±89,12	52,76 ±7,64	91,84 ±30,05	18,92 ±3,49	60,93 ±23,79	27,87 ±6,86
Recomendation	-	-	(55 – 75)	-	(10 – 15)	-	(15 – 30)
	G. Sat. (g)	G. Mon. (g)	G.Pol. (g)	Ω - 6 (g)	Ω - 3 (g)	Coles (mg)	Fibras (g)
Mean±SD	32,04 ±16,17	20,2 ±8,34	11,9 ±5,47	11,48 ±6,16	1,4 ±0,72	430,12 ±232,96	22,79 ±13,26
Recomendation	-	-	-	13 g	1,4 g	-	> 28 g
Inadequancy (%)	-	-	-	65,3	51	-	73,46

Vitamins	Vit A (mcg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Pyridoxine (mg)	Folate (mcg)	Cobalamin (mcg)	Vit C (mg)	Vit D (mcg)	Vit E (mg)
Mean±SD	1180,15 ±2953,38	1,08 ±0,63	1,76 ±1,25	17,76 ±9,64	0,96 ±0,57	244,4 ±196,5	231,80 ±298,58	612,4 ±1449,31	22,00 ±76,56	2,30 ±1,27
EAR	550	1,2	1,2	14	1,6	520	2,2	70	10	12
Inadequancy (%)	65,31	63,27	28,57	38,78	87,76	93,88	0	63,27	89,8	100

Minerals	Ca (mg)	Cu (mg)	Fe (mg)	K (mg)	Mg (mg)	Mn (mg)	Na (mg)	P (mg)	Se (mcg)	Zn (mg)
Mean±SD	657,32 ±419,52	1,91 ±4,42	11,20 ±4,46	2121,31 ±709,74	208,5 ±77,76	2,31 ±1,07	1523,84 ±984,13	1190,18 ±450,39	74,33 ±38,56	29,01 ±28,69
EAR	800	0,8	22	-	290	-	-	580	49	9,5
Inadequancy (%)	75,6	34,7	97,96	-	85,71	-	-	6,12	26,53	20,41

SD = standard deviation; CHO = Carbohydrates; PTN = Protein; LIP = Lipids; G. Sat. (g) = saturated fat gram; G. Mon. (g) = gram monounsaturated fat; G.Pol. (g) = gram polyunsaturated fat; Ω - 6 (g) = omega 6 grams; Ω - 3 (g) = omega 3 grams; Coles (mg) = milligram cholesterol. EAR = Estimated Average Requirement; Vit = Vitamin; Ca = Calcium; Cu = Copper; P = Phosphorus; Mg = Magnesium; Mn = Manganese; SE = Selenium; Zn = Zinc; Na = Sodium.

Table 2 Distribution of values of mean and standard deviation of macro and micronutrients according to the average consumption of ultra-processed foods by pregnant women attended in the prenatal care of the municipalityof Picos-PI between August to December 2019.

Nutrients	Consumption of nutrients according to UPP consumption		
	UPP < 21,05 %	UPP ≥ 21,05 %	p valor*
Macronutrients			
Energy (kcal)	1837,78 ± 546,31	2175,95 ± 626,16	0,053
CHO (g)	243,77 ± 80,95	285,91 ± 98,36	0,111
CHO (kcal)	53,08 ± 8,49	52,20 ± 6,09	0,701
PTN (g)	87,61 ± 30,47	99,10 ± 28,69	0,200
PTN (kcal)	19,20 ± 3,49	18,42 ± 3,53	0,458
LIP (g)	55,60 ± 23,29	70,12 ± 22,36	0,038
LIP (kcal)	27,03 ± 6,99	29,31 ± 6,58	0,266
Cholesterol (mg)	423,28 ± 262,93	441,89 ± 176,10	0,790
Saturated fat (g)	28,54 ± 12,9	38,07 ± 19,58	0,045
Monosaturated fat (g)	18,77 ± 8,08	22,66 ± 8,42	0,116
Polyunsaturated fat (g)	11,02 ± 5,24	13,42 ± 5,67	0,140
Fibers (g)	23,00 ± 12,64	22,42 ± 14,64	0,883
Micronutrients			
Ômega – 6 (g)	10,79 ± 6,55	12,67 ± 5,39	0,309
Ômega – 3 (g)	1,37 ± 0,721	1,61 ± 0,737	0,277
Vitamin A (mcg)	1472,74 ± 3643,17	676,23 ±883,54	0,368
Thiamine B1 (mg)	0,885 ± 0,405	1,44 ± 0,804	0,002
Riboflavin B2 (mg)	1,66 ± 1,49	1,93 ± 0,66	0,473
Niacin B3 (mg)	16,87 ± 9,60	19,29 ± 9,80	0,404
Pyridoxine B6 (mg)	0,918 ± 0,539	1,04 ± 0,629	0,443
Folate B9 (mcg)	252,10 ± 232,26	231,14 ± 116,33	0,723
Cobalamin B12 (mcg)	177,94 ± 212,00	324,56 ± 397,49	0,097
Vitamin C (mg)	827,50 ± 1754,83	241,93 ± 516,57	0,175
Vitamin D (mcg)	6,94 ± 24,28	47,93 ± 119,94	0,070
Vitamin E (mg)	2,14 ± 1,25	2,60 ± 1,28	0,224
Calcium (mg)	535,88 ± 371,29	866,47 ± 424,77	0,006
Copper (mg)	2,32 ± 5,47	1,20 ± 1,23	0,397
Iron (mg)	10,71 ±4,42	12,03 ± 4,52	0,325
Potassium (mg)	2108,20 ±678,52	2143,90 ± 780,38	0,867
Magnesium (mg)	204,13 ± 72,78	216,03 ± 87,35	0,610
Manganês(mg)	2,35 ± 1,19	2,24 ± 0,851	0,725
Sodium (mg)	1308,08 ± 914,56	1895,42 ± 1013,67	0,042
Phosphorus (mg)	1101,26 ± 422,85	1343,33 ± 466,88	0,069
Selenium (mcg)	69,21 ± 37,01	83,16 ± 40,62	0,226
Zinc (mg)	27,89 ± 25,12	30,94 ± 34,71	0,723

The analysis of the caloric contribution of the food groups showed a diet characterized by greater consumption of rice, beef / meat and cereals / flour / derivatives, which are the foods with the greatest contribution in the fresh or minimally processed group.

In the processed group, French bread was the most consumed food. Regarding the UPP group, the foods that most influenced energy consumption were cakes and cookies, followed by fast food snacks (Table 3).

Table 3 Average and percentage of calorie consumption of fresh or minimally processed, processed and ultra-processed food by pregnant women attended in the prenatal care of the municipality of Picos-PI from August to December 2019.

Food groups	Kcal/day	% of total calories consumption
Fresh or minimally processed	1297,4	68,89
Rice	369,53	19,19
meat/insides	161,40	8,40
Other Cereals / Flours / Derivatives	140,05	8,03
milk	120,18	6,43
Bean	95,36	4,67
Chicken / Fish / insides	87,50	4,94
Fruits and Vegetables	82,08	4,90
Pasta	82,05	4,27
Eggs	65,4	3,63
Fruit	65,23	3,81
Juices / Vitamins	47,75	2,48
Pork meat	41,08	1,70
Vegetables	16,85	1,08
Other culinary preparations / Food	6,73	0,33
Processed	110,5	5,43
French Bread / Cheese Bread	51,32	2,80
Cheese	36,29	1,61
Others (Canned / Crackling foods)	12,77	0,66
Sweets	10,10	0,35
Ultra-processed	421,2	21,05
Cakes	81,93	4,12
Salty / sweet biscuit	65,62	3,07
Fast food snacks	56,15	3,11
Embedded	45,46	2,54
Sugary Drinks	44,00	2,22
Industrialized breads	35,32	1,60
Other foods	27,50	1,36
Sweets / Ice cream	22,68	1,05
Industrialized yogurt	15,5	0,77
Industrialized Flours	13,26	0,62

Higher means of ingestion of fresh or minimally processed foods were observed among pregnant women who showed less participation of UPP foods in the diet, however there was only a statistically significant difference in the consumption of cereals, flours and derivatives (p<0.0049) (Table 4).

Table 4 Consumption of fresh or minimally processed foods according to the average consumption of ultra-processed foods by pregnant women attended in the prenatal care of the municipality of Picos-PI from August to December 2019.

Food	Total average	UPP < 21,05 %	UPP ≥ 21,05 %	p valor*
Rice	285,5	296,81	282,14	0,7686
Bean	117,63	117,98	123,60	0,8835
Pasta	46,2	63,06	19,72	0,1637
Cereals / Flours / Derivatives	75,56	103,73	32,80	0,0049
Beef / Kids	85,22	84,31	91,53	0,7897
Chicken / Fish / insides	49,21	52,97	45,70	0,7078
Pork meat	12,05	12,5	11,94	0,9665
Eggs	30,61	34,17	26,39	0,4437
milk	208,62	232,96	179,66	0,3052
Fruit	101,35	123,82	68,28	0,1272
Vegetables	41,73	46,14	36,44	0,5281

UPP: ultra processed products

In relation to the association of socioeconomic variables with the average consumption of ultra-processed foods (Table 5), it was observed that pregnant women who received government assistance consumed less UPP foods.

Table 5 Correlation of socioeconomic variables categorized according to the average consumption of ultra-processed foods by pregnant women attended in the prenatal care of the municipality of Picos-PI from August to December 2019.

Variables	Categories	UPP < 21,05 % n (%)	UPP ≥ 21,05 % n (%)	p valor*
Age (years)	<25	10 (50)	10 (50)	0,110
	>25	21 (72,41)	8 (27,59)	
Education	Illiterate to elementary school	13 (73,22)	5 (27,78)	0,322
	Incomplete high school to higher education	18 (58,06)	13 (41,94)	
Income	≤ 2 MW	23 (67,65)	11(32,35)	0,338
	> 2 MW	8 (53,33)	7 (46,67)	
Government aid	Yes	21 (75)	7 (25)	0,049
	No	10 (47,62)	11 (52,38)	
Marital status	Married	27 (62,79)	16 (37,21)	0,854
	Single	4 (66,67)	2 (33,33)	

MW: minimum wage; UPP: ultra processed product

DISCUSSION

In this study, it was possible to assess food consumption of pregnant women, as well as their socioeconomic profile. Women with low income, married and low education were the majority.

These findings were found to have a negative impact on food consumption, since years of schooling are believed to be an important factor related to food choices. The macronutrients consumption proved to be inadequate as well as some micronutrients.

The contribution of ultra-processed foods to the diet of pregnant women proved to be significantly high, reflecting a change in the dietary profile towards unfavorable health impact. Conversely, pregnant women who receive government aid were a protective factor regarding the consumption of UPP.

The consumption of carbohydrates represented 52.76% of the total energy value, which is lower than recommended by WHO (55-75%). Diverging from the results in this study, the studies carried out by (Andrade e colaboradores, 2015; Fazio e colaboradores, 2011). presented consumption of carbohydrates within the recommendations (55% of the Total Energy Intake - TEI).

Carbohydrates are the main source of body energy and its metabolism is an important determinant of fetal growth. Reduced carbohydrates consumption may contribute to adverse perinatal outcomes (Fazio e colaboradores, 2011).

The fiber intake was lower than recommended, corresponding to 22.79 g and inadequacy percentage of 73.46%. In another study, it was observed that the average fiber consumption did not meet the recommendations, especially for low weight pregnant women who consumed an average of 17 g (Fazio e colaboradores, 2011).

Low fiber intake can increase the risks of pre-eclampsia, glucose tolerance, intestinal constipation and type 2 Diabetes Mellitus (Buss e colaboradores, 2009).

Vitamin E was also consumed less than recommended (12 mg), with an average value of 2.30 mg, in addition to the high percentage of inadequacy (100%). The low vitamin E consumption seems to be related to the occurrence of pre-eclampsia, as there are reports of significantly reduced vitamin E levels in pregnant women with the disease (Ikpen e colaboradores, 2012).

A high rate of inadequacy (93.88%) was observed when folate intake was analyzed, which was slight lower than the value found (99.6%) in a study conducted with Spanish pregnant women (Rodríguez-Bernal e colaboradores, 2013).

Folate deficiency occurs due to the high demand in this period, and low concentrations are associated with malformation of the neural tube, including anencephaly and spina bifida, in addition to causing megaloblastic anemia, premature birth and low birth weight (Lacerda e colaboradores, 2012).

It is noteworthy that the high inadequacy of folic acid consumption may be overestimated, since, in Brazil, there is specific legislation for addition of iron and folic acid in flour and, consequently, bakery products, which could not be included in the tables composition (Brasil, 2002).

In the present study, the percentage of inadequacy was assessed only by eating food sources, not considering any type of supplementation.

We found low Calcium intake (657.32 mg), with 75.6% inadequacy. A previous study also found lower Calcium levels recommended by DRI´S (Jerônimo e colaboradores, 2018).

Calcium deficiency in pregnant women is associated with a higher hypertension risk, a disease that, if left untreated, can seriously affect the mother-child health. Mobilization of maternal bone calcium and postmenopausal osteoporosis can also be found in these women (Olausson e colaboradores, 2012).

Iron was very low in relation to the recommended as well as in other study that also presented lower values, 12.51 mg (Jerônimo e colaboradores, 2018).

The prolonged iron deficiency, in addition to inadequate consumption of other important nutrients, is associated with the development of gestational anemia, causing health damage to the mother and fetus (Camargo e colaboradores, 2013).

The consumption of ultra-processed foods in the study represented 21.05% of the total caloric consumption, a result lower than that of Fernandes e colaboradores (2019) who analyzed the relationship between the pre-gestational nutritional status and the type of food consumed by high-risk pregnant women.

The total caloric intake found in this study was 38.07%. The data show how much

this type of food is present in the Brazilian diet and how much it is necessary to develop strategies that encourage the consumption of fresh / minimally processed foods during pregnancy (Martins e colaboradores, 2013; Crivellenti, Zuccolotto e Sartorelli, 2018).

Nutrient intake was verified according to the consumption of ultra-processed foods. When comparing the two groups of pregnant women (UPP <21.05% and UPP ≥ 21.05), it can be seen that the average consumption for lipid, saturated fat, thiamine, calcium and sodium was higher for the UPP ≥ 21, 05 group.

Corroborating the study by Fernandes e colaboradores (2019) where they found that the average of lipids, sodium and monounsaturated and polyunsaturated fatty acids obtained the highest average in ultra-processed foods.

In a study by Louzada e colaboradores (2015), when analyzing the impact of ultra-processed foods on the micronutrient content of the diet in Brazil, it was found that higher levels of calcium were associated with higher intake of UPP. The positive association between UPP consumption and Calcium intake was not expected, since this nutrient is more prevalent in fresh foods.

We verified a statistical difference regarding the consumption of cereals, resulting in greater consumption in those pregnant women who consumed below the average (UPP <21.05%).

Our data corroborate with Araújo e colaboradores (2016) and Camargo e colaboradores (2013) who studied the percentage of food contribution in pregnant women and noted that the highest consumption in the group of fresh or minimally processed foods was rice, followed by beef and cereals, which are typical of Brazilian diet.

In the group of processed and ultra-processed, there is a great frequency of sweets and caloric foods. This pattern of food consumption reflects the change trends in the eating habits of Brazilians, which are expressed by lower caloric expenditure and higher consumption of foods rich in sugar, fat and industrialized products (IBGE, 2011).

Therefore, it is recommended to reduce the consumption of this type of food, as they have a higher content of saturated fat, trans fat and free sugar, in addition to having a low fiber and protein content when compared to fresh / minimally processed foods (Louzada e colaboradores, 2015).

The pregnant women in our study who received government assistance (Bolsa Família) consumed less ultra-processed foods. A study conducted in Maceió / Alagoas-Brazil with families benefiting from the Bolsa Família program, showed that the main products purchased were rice, beans, pasta and chicken, which are in the fresh and minimally processed food group (Cabral e colaboradores, 2013).

This finding is relevant because it shows that the Bolsa Família Program contributes for improving food choices for vulnerable pregnant women.

It is noteworthy that the present study has limitations such as the size of the sample studied. It is assumed that the larger the sample size, the more accurate and meaningful data are found.

Since food consumption is very variable between individuals, the variables are difficult to assess reliably. However, the present study found association trends and significant results. Another limitation was the lack of research regarding supplementation by pregnant women.

CONCLUSION

As for the consumption of macronutrients and micronutrients, the study showed inadequacy of important nutrients from both groups, which may be a consequence of the high consumption of ultra-processed foods.

The high consumption of UPP may have contributed to the inadequacy of vitamin E, folate, calcium and iron, which are essential micronutrients in the gestational period, as they help the proper development of the fetus.

It was also found that the group of fresh and minimally processed foods had a higher percentage of contribution to the caloric consumption of pregnant women.

The ultra-processed group also had considerable consumption, where pregnant women had a higher intake of lipids, saturated fat and sodium, as well as thiamine and calcium.

We also demonstrated that the Bolsa Família program had a positive association with the consumption of fresh or minimally processed foods, being considered as a protective factor against the consumption of ultra-processed foods.

Thus, this work sheds light on the consumption of UPP by pregnant women attended in the public network, and that the results serve as a subsidy for decision making

by public managers in actions involving pregnant women.

Further studies in this area are necessary to enable better strategies and actions regarding health and protection of the mother-child.

REFERENCES

1-Andrade, B. D.; Silva, A. C. P.; Santos, M. T. M; Campos, T.; Luquetti, D. P. C. S.; Cândido, C. P. A.; Oliveira, S. M. R.; Nemer, A. S. A.; Neto, P. M. Fatores nutricionais e sociais de importância para o resultado da gestação, em mulheres em acompanhamento na rede de atenção primária de Juiz de Fora. Rev. Méd. de Minas Gerais. Minas Gerais. Vol. 25. Num. 3. 2015. p.344-352.

2-Araújo, E. S.; Santana, J. M.; Brito, M. S.; Santos, D. B. Consumo alimentar de gestantes atendidas em unidades de saúde. Mundo saúde. São Paulo. Vol. 40. Num. 1. 2016. p. 28-37.

3-Beaton, G. H. Spproaches to analysis of dietary data:relationship between planned analyses and choice of metodology. American Jour of CliNutri. Vol.59. Num. 3. 1964. p.253s-261.

4-Bueno, A. A.; Beserra, J. A. S.; Weber, M. L. Características da alimentação no período gestacional. Life Style, São Paulo. Vol. 3. Num 2. 2016. p.29-42.

5-Buss, C.; Nunes, M. A; Camey, S.; Manzolli, P.; Soares, R. M; Drehmer, M.; Giacomello, A.; Duncan, B. B; Schmidt, M. I. Consumo de fibra alimentar de gestantes atendidas em clínicas gerais no sul do Brasil - O estudo ECCAGE. Nutrição em Saúde Pública. Vol. 12. Num. 9. 2009. p.1392-1398.

6-Brasil. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução RDC n° 344, de 13 de dezembro de 2002. Aprova o Regulamento Técnico para a fortificação das farinhas de trigo e das farinhas de milho com ferro e ácido fólico. Diário Oficial da União; Poder Executivo. Brasília. 2002.

7-Cabral, M. J.; Vieira, K. M.; Sawaya, A. L.; Florêncio, T. M. M. T. Perfil socioeconômico nutricional e de ingestão alimentar de beneficiários do Programa Bolsa Família. Estudos avançados. Vol. 27. Num. 78. 2013.

8-Camargo, R. M. S.; R. A.; Pereira, E. M.; Yokoo, A.; Sachs, E.. Consumo Alimentar De Gestantes Atendidas Em ambulatório De Pré-Natal Da Rede pública. Ciência Cuidado E Saúde. Vol. 11. Num. 3. 2013. p.489-98.

9-Crivellenti, L. C.; Zuccolotto, D.; Sartorelli, D. S. Desenvolvimento de um Índice de Qualidade da Dieta Adaptado para Gestantes. Rev Saúde Pública. Vol. 52. Num. 59. 2018.

10-Fazio, E. S.; Nomura, R. M.; Dias, M. C.; Zugaib, M. Consumo dietético de gestantes e ganho ponderal materno após aconselhamento nutricional. Rev. Bras, Ginecol Obstet. São Paulo. Vol. 33. Num. 2. 2011. p.87-92.

11-Fernandes, D. C.; Correno, I.; Silva, A. A.; Guerra, T. B.; Adami, F. S.; Relação entre estado nutricional pré-gestacional e o tipo de processamento de alimentos consumidos por gestantes de alto risco. Rev. Bras. Saúde Matern. Infant. Recife. Vol. 19. Vol. 2. 2019. p.363-374.

12-Gomes, R. N. S.; Gomes, V. T. S.; Caldas, D. R. C.; Lago, E. C.; Campos, F. K. L.; Gomes, M. S. Perfil nutricional e socioeconômico de gestantes assistidas em unidades básicas de saúde de Caxias-MA. Rev. interdisciplin. Vol. 8. Num 4. 2015. p. 127-135.

13-IOM. Institute of Medicine. Dietary Reference Intakes. Committee to Review Dietary Reference Intakes. Washington (DC): National Academies Press (US). 2011.

14-Ikpen, M. A.; Eigbefoh, J.; Eifediyi, R. A.; Isabu, P. A.; Okogbenin, S.; Okogbo, F. O.; Momoh, M.; Ekwedigwe, K. C. Determination of antioxidant status of pre-eclamptic and normotensive sub-rural Nigerian pregnant women at the Irrua Specialist Teaching Hospital, Irrua, Edo State. The journal of maternal-fetal & neonatal medicine: the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians, Vol. 25. Num. 10. 2012. p.2046-2050.

15-IBGE. Instituto Brasileiro de Geografia e Estatística. Pesquisa de orçamentos familiares

2008-2009: análise do consumo alimentar pessoal no Brasil. IBGE, Coordenação de Trabalho e Rendimento. Rio de Janeiro. IBGE. 2011. 150 p.

16-Jerônimo, A. L.; Aguiar, B. K.; Sampaio, R. M.; Silva, R. S.; Pinto, F. J. M. Perfil epidemiológico e nutricional de gestantes no terceiro trimestre de gestação. Rev. Uniabeu. Vol. 11. Num. 27. 2018. p.271-282.

17-Lacerda, S. K. S.; Macedo, K. G. F.; Freire, J. A. P.; Voci, M. S. Prevalência da inadequação no consumo de nutrientes entre gestantes atendidas em unidades básicas de saúde. Rev. bras. educ. méd. Vol. 27. Num. 3. 2012. p.357.

18-Louzada, M.L.C.; Martins, A.P.B.; Canella, D. S.; Balradi, L.G.; Levy, R.B.; Claro, R.F.; Moubarac, J.; Cannon, G.; Monteiro, C. A. Impacto de alimentos ultraprocessados sobre o teor de micronutrientes da dieta no Brasil. Rev. Saúde Pública. Vol. 49. Num.45. 2015.

19-Martins, A. P. B.; Levy, R. B.; Claro, R. M, Moubarac, J. C.; Monteiro, C. A. Participação crescente de produtos ultraprocessados na dieta brasileira (1987-2009). Rev Saúde Pública. Vol. 47. Num. 4. 2013. p.656-665.

20-Ministério da Saúde. Brasil. Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Guia alimentar para a população brasileira. 2ª edição. Brasília. Ministério da Saúde. 2014.

21-Monteiro, C. A,; Cannon, G.; Levy, R.; Moubarac, J.; Jaime, P.; Martins, A. P.; Canella, D; Louzada, M.; Parra, D.; Camila, R.; Calixto, G.; Priscila, M.; Martins, C.; Martinez, E.; Baraldi, L.; Garzillo, J.; Sattamini, I. ANOVA. A estrela brilha. [Classificação dos alimentos. Saúde pública]. World Nutrition. São Paulo. Vol. 7. Num. 1. 2016. p.28-40.

22-Moshfegh, A. J.; Rhodes, D. G.; Baer, D. J.; Murayi, T.; Clemens, J. C.; Rumpler, W. V.; Paul, D. R.; Sebastian, R. S.; Kuczynski, K. J.; Ingwersen, L. A.; Staples, R. C.; Cleveland, L. E. The US Department of Agriculture Automated Multiple-Pass Method reduces bias in the collection of energy intakes. The American journal of clinical nutrition. Vol. 88. Num. 2. 2008. p.324-332.

23-Moura, A. R.; Azevedo, F. H. Evidências cientificas sobre a alimentação de gestantes. Saúde foco, Teresina. Vol. 5. Num 1. 2018. p. 78-90.

24-Olausson, H.; Goldberg, G. R.; Laskey, M. A.; Schoenmakers, I.; Jarjou, L. M. A.; Prentice, A. Calcium economy in human pregnancy and lactation. Nutr. Res. Rev. Vol. 25. Num. 1. 2012. p.40-67.

25-Rodríguez-Bernal, C. L.; Ramón, R.; Quiles, J.; Murcia, M.; Navarrete-Muñoz, E. M.; Vioque, J.; Ballester, F.; Rebagliato, M. Dietary Intake in Pregnant Women in a Spanish Mediterranean Area: as Good as It Is Supposed to Be? Public Health Nutrition. Barcelona, Spain. Vol. 16. Num. 8. 2013. p.1379-1389.

26-Sartorelli, D. S.; Crivellenti, L. C.; Manochio-Pina, M. C.; Baroni, N. F.; Carvalho, M.R.; Diez-Garcia, R. W.; Franco, L. J. Study protocol effectiveness of a nutritional intervention based on encouraging the consumption of unprocessed and minimally processed foods and the practice of physical activities for appropriate weight gain in overweight, adult, pregnant women: a randomized controlled trial. BMC. Pregnancy and childbirth. Vol. 20. Num. 01. 2020. p.24.

27-Verly-Jr, E.; Castro, M. A.; Fisberg, R. M.; Marchioni, D. M. L. Precision of usual food intake estimates according to the percentage of individuals with a second dietery measurement. J Acad nutr diet. Vol. 112. Num. 7. 2012. p.1015-1020.

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