Assessment of Food Frequency Intake and Dietary Habits for Diabetic Pregnant Women

تقييم تكرار الطعام المأخوذ والعادات الغذائية للنساء الحوامل المصابات بداء السكري

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المستخلص

الهدف: تهدف الدراسة إلى تقييم تكرار الطعام المأخوذ والعادات الغذائية للنساء الحوامل المصابات بداء السكري.
المنهجية: أجريت دراسة وصفية للفترة من الرابع من تشرين الثاني٢٠١٣ ولغاية الخامس والعشرون من آب ٢٠١٤.
تم إختيار عينة غرضية غير إحتمالية مكونة من (١٠٠) إمرأة حامل مصابة بداء السكري من مركز السكري والغدد الصماء في مدينة العمارة. تم تطوير إستمارة إستبيانية كأداة لجمع البيانات. تم تحديد ثبات المحتوى لأداة الدراسة من خلال مجموعة من الخبراء. تم تحديد الصدق لأداة الدراسة من خلال تقنية فصل-النصف والتي أشارت إلى أن معامل الصدق كان (٠،٧٩) لجميع محتوى الأداة. إستخدمت المقابلة المبرمجة مع كل إمرأة حامل مصابة بالسكري لجمع البيانات. تم تحليل البيانات من خلال تطبيق إسلوب تحليل البيانات الإحصائي الوصفي كالتكرارات والنسبة المئوية والإنحراف المعياري وأسلوب تحليل ابيانات الإحصائي الإستنتاجي كتحليل التضادد الخطي.
النتائج: أشارت نتائج الدراسة إلى الأغلبية العظمى من النساء الحوامل لديهن مستوى مقبول من تكرار الطعام المأخوذ والعادات الغذائية. عندما تصبح المرأة حامل ومصابة بداء السكري، فإنها تحتاج إلى أكثر من مستوى مقبول وكذلك يمكنها المرور خلال حمل وولادة آمنتين وصحيتين والحصول على وليد خالي من المضاعفات.
التوصيات: أوصت الدراسة إلى إقامة تعاون وتنسيق بين معهد بحوث التغذية ومركز الغدد الصماء والسكري في مدينة العمارة بما له علاقة بالنساء الحوامل المصابات بداء السكري وأنماطهن الغذائية. إجراء دراسة أخرى على عينة كبيرة وعلى المستوى الوطني.

Abstract

Objective: The study aims at assessing the food frequency intake and dietary habits for diabetic pregnant women.
Methodology: A descriptive study is carried out for the period from November4th 2013 to August 25th 2014. A purposive "non-probability" sample of one hundred diabetic pregnant women is selected from the Diabetic and Endocrine Center in Al-Amarha City. A questionnaire is developed as a tool of data collection. Content validity of the study instrument is determined through panel of experts. Split-half reliability technique is used for reliability determination of the study instrument which depicts a reliability coefficient of (0.79) for the entire scale. A structured interview with each diabetic pregnant woman is applied for data collection. Data are analyzed through the application of descriptive statistical data analysis approach of frequency, percent and standard deviation and inferential statistical data analysis approach of linear regression.
Results: The results of the study indicated that the vast majority of pregnant women have acceptable level of food frequency intake and dietary habits. Being them pregnant with diabetes, they need to have more than acceptable level so they can go through a healthy and safe pregnancy, as well as labor and having a healthy baby without complications.
Recommendations: The study recommends for the initiation of collaboration and coordination between the Nutrition Research Institute and the Diabetic and Endocrine Center in Al-Amara City concerning the diabetic pregnant women and their dietary patterns. Further study can be conducted on a large sample size and nation-wide base.
Key Words: **Assessment, Food Frequency Intake, Dietary Habits, Diabetic Pregnant Women**.

Introduction

Diabetes in pregnancy, whether pre-existing (type I or type II diabetes) or arising during pregnancy as gestational diabetes mellitus (GDM), increases the risk of serious complications for both mother and the child. Adverse effects associated with diabetes in pregnancy can be short-term or long-term. The incidence of gestational diabetes mellitus differs in different populations [(1).]

Gestational diabetes is a form of diabetes mellitus that develops during pregnancy which is managed with meal planning, activity, and in some cases, insulin therapy to normalize blood glucose levels. Proper nutrition during pregnancy is considered important for the wellbeing of both mother and fetus. A balanced diet supports maternal growth and development of the fetus [(2)].

Diabetes management is primarily behavioral, involving daily medication taking, glucose testing, exercise and nutrition-related action(The adoption of a healthy and balanced diet requires a series of behavioral changes in eating patterns with regards to meal planning, food selection, food preparation, dinning out, portion control, as well as appropriate responses to eating challenges. Dietary changes need be consistent and applied to all lifestyle aspects [(3).] Dietary pattern analysis is a method that aims to describe the whole diet. The use of dietary patterns might help us to capture some of the complexity of diet that may be lost in nutrient-based analyses, and provide additional information when exploring the relationship between nutrition and disease [(4)].

According to the Statistics Department of the Ministry of Health in Iraq, the incidence of diabetes during pregnancy for the year of 2013 was (6394) cases excluding that of Kurdistan Region and (2%) is for pregnant women. In AL-Amarah City, there is (203) cases [(5)].

In the present study, the researcher plans to conduct an assessment of the dietary patterns for the diabetic pregnant women through their food frequency intake and dietary habits attending the Diabetic and Endocrinology Center in AL-Amarha City to specify their needs and problems that may assist in designing health education programs with regard to proper dieting during pregnancy.

Methodology

A purposive "Non- probability" sample of (100) diabetic pregnant women is selected for the present study. The sample is assigned to the study according to the following inclusion criteria:

1. Pregnant women with diabetes.
2 .Those who are aged from 17-45 years old.
3. Those who are attending the Diabetes and Endocrinology Center only.

Originally, the study is held at the Diabetes and Endocrinology Center in AL-Amarah City.

An assessment tool is developed in a form of a questionnaire through an intensive relevant literature and studies review. The instrument is composed of two major parts as follows: **Part I:** Assessment of Food Frequency Intake: It is comprised of (62) items which are measured on 5-levels scale.

The overall assessment is measured through as Good (3.68-5.00), Acceptable (2.34-3.67) and Poor (1-2.33).

Part II: Assessment of Dietary Habits: It is comprised of (21) items which are measured on 3- levels scale. The overall assessment is measured as High (2.34-300), Moderate (1.68-2.33) and Low (1-1.67).

Internal consistency reliability for the questionnaire is determined through the computation of the Cornbach's Alpha Correlation Coefficient. The coefficient (r =.79) has indicated that the scale is adequately reliable measure for the variables underlying the study.

Results:

Table 1. Assessment of Food Frequency Intake for Diabetic Pregnant Women

Food Frequency Intake	Frequency	Percent
Low(62-144)	3	3.0
Moderate (145-227)	97	97.0
High (228-310)	0	0.0
Total	100	100.0

This table reveals that the vast majority of diabetic pregnant women have moderate food frequency intake (*n= 97;* 97.0%), and a small proportion of them have poor food frequency intake (*n= 3;* 3.0%).

Table 2. Pregnant Women's Food Frequency Intake

List	Items	None	1-2 times monthly	1-4 times weekly	<and5 times daily	>5 times daily	Mean (SD)	FF Assessment
		F	F	F	F	F		
1.	Grains							
1.1	Bread	0	1	5	6	88	1.20	L
1.2	Rice	16	18	56	0	10	2.70	M
1.3	Groat	23	40	34	0	3	3.78	H
1.4	Lattice	28	41	30	0	1	3.94	H
1.5	Corn	71	20	8	0	1	4.60	H
1.6	Macaroni	57	25	17	0	1	4.38	H
2.	Fruits							
2.1	Orange	3	3	32	2	60	1.87	L
2.2	Clementina	10	5	45	5	35	2.50	M
2.3	Lemon	5	13	20	9	53	2.48	M
2.4	Pomegranate	21	35	36	0	8	3.61	M
2.5	Dates	30	17	40	0	13	3.51	M
2.6	Peach	53	27	16	1	3	4.26	H

Continues

Table 2. Continues

List	Items	None	1-2 times monthly	1-4 times weekly	<and5 times daily	>5 times daily	Mean (SD)	FF Assessment
		F	F	F	F	F		
2.7	Apple	29	19	32	4	16	3.41	M
2.8	Banana	35	19	23	3	20	3.50	M
3.	Vegetables							
3.1	Green pepper	16	15	41	2	26	3.07	M
3.2	Tomato	0	2	17	6	75	4.54	H
3.3	Coriander	68	9	13	1	9	1.74	L
3.4	Celery	7	8	21	6	58	4.00	H
3.5	Spinach	29	33	34	0	4	2.17	L
3.6	Chard	15	55	28	1	1	2.18	L
3.7	Turnip	28	31	31	1	9	2.32	L
3.8	Lettuce	7	5	26	4	58	4.01	H
3.9	Cabbage	30	21	24	1	24	2.68	M
3.10	Cauliflower	52	24	20	1	3	1.79	L
3.11	Eggplant	8	8	66	4	14	3.08	M

Continues

Table 2.Continues

List	Items	None	1-2 times monthly	1-4 times weekly	<and5 times daily	>5 times daily	Mean (SD)	FF Assessment
		F	F	F	F	F		
3.12	Okra	6	54	37	1	2	2.39	M
3.13	Garlic	33	25	28	0	14	2.37	M
3.14	Onion	19	13	30	3	35	3.22	M
3.15	Squash	1	28	25	43	3	3.22	M
3.16	Carrots	1	13	26	40	2	2.22	L
3.17	Cucumber	2	2	19	6	71	2.83	M
3.18	Potato	15	11	41	2	31	3.22	M
3.19	Vegetable		3	14	5	75	4.45	H
3.20	Hot pepper	83	8	5	2	2	1.31	L
4.	Milk and products							
4.1	Yoghurt	5	4	19	4	68	4.25	H
4.2	Full cream	56	12	23	0	9	1.93	L
4.3	Semi creamy	58	8	18	1	15	2.06	L
4.4	Cream	40	10	25	0	25	2.59	M

Continues

Table 2. Continues

List	Items	None	1-2 times monthly	1-4 times weekly	<and5 times daily	>5 times daily	Mean (SD)	FF Assessment
		F	F	F	F	F		
4.5	Cheese	18	10	28	0	44	3.41	M
5.1	Red meat	12	9	35	1	43	3.53	M
5.2	White meat	3	12	74	1	10	3.02	M
5.3	Egg	18	6	24	0	52	3.61	M
6.	Legumes							
6.1	Chickpeas	11	26	55	1	7	2.66	M
6.2	Beans	10	11	76	0	3	2.74	M
6.3	Broad beans	14	49	33	1	3	2.29	L
6.4	Lentil	6	39	51	0	4	2.57	M
6.5	Pharsalus mango	27	45	26	0	2	2.05	L
6.6	Kidney bean	35	44	21	0	0	1.86	L
6.	Drinks							
7.1	Tea	4	0	2	7	87	1.27	L
7.2	Coffee	71	13	11	1	4	4.46	H

Continues

Table 2.Continues

List	Items	None	1-2 times monthly	1-4 times weekly	<and5 times daily	>5 times daily	Mean (SD)	FF Assessment
		F	F	F	F	F		
7.3	Nescafe	62	18	17	0	3	4.36	H
7.4	Cacao	55	23	20	0	2	4.79	H
7.5	Carbonated drinks	36	12	41	0	11	3.62	M
7.6	Natural juices	41	20	20	1	18	3.65	M
7.7	Industrial juices	65	13	17	1	4	4.28	H
7.8	Herbs (Cinnamon, thymus, chamomile)	46	29	19	2	4	4.11	H
8.	Fats							
8.1	Margarine	51	19	14	0	16	3.89	H
8.2	Animal butter	81	11	8	0	0	4.73	H
8.3	Fatty soup	8	6	23	3	60	1.99	L
8.4	Fat	72	21	7	0	0	4.65	H
8.5	Fried vegetables	5	9	43	1	42	2.34	M
8.6	Cooking oil	7	4	6	1	82	1.53	L

Cut-off point: 1-2.33= Low; 2.34–3.67= Moerate; 3.68-5.00=High. H= High; M = Moderate; L = Low ;FFI=Food Frequency Intake

Table 2 demonstrates that diabetic pregnant women have low dietary patterns for the items 1.1., 7.1, 3.20, 8.6, 3.3, 3.10, 6.6, 2.1, 4.2, 8.3, 6.5, 4.3, 3.5, 3.6., 3.16, 6.3, 3.7, and 2.3 respectively.

Table 3. Assessment of Dietary Habits for Diabetic Pregnant Women

Dietary Habits' Levels	Frequency	Percent
Low (21-34)	3	3.0
Moderate (35-49)	93	93.0
High (50-63)	4	4.0
Total	100	100.0

This table displays that the vast majority of diabetic pregnant women have a moderate level of dietary habits (93.0%).

Table 4. Diabetic Pregnant Women's Dietary Habits

List	Item	Always	Sometimes	Never	Mean (SD)	DH Ass.
		F	F	F		
	Healthy Habits					
1	Drinking tea 2houers after meal	22	13	65	1.57± 0.832	L
2	Drinking tea with saccharin	8	6	86	1.22± 0.579	L
3	Consume leafy vegetables a lot	79	18	3	2.76± 0.495	H
4	Consume salad with each meal	64	34	2	2.62± 0.528	H
5	Consume	75	24	1	2.74± 0.463	H
6	Consume breakfast	80	17	3	2.77± 0.489	H
7	Consume snacks	19	54	27	1.92± 0.677	M
8	Exercising	26	39	35	1.91± 0.780	M

Continues

Table 4 Continues

9	Feels comfortable when eating with family	86	10	4	2.82± 0.479	H
10	Drinking tea while eating (*r)*	49	25	26	1.77± 0.839	M
11	Drinking tea with sugar (*r)*	61	18	21	1.60± 0.816	L
12	Consume canned foods a lot (*r)*	5	45	50	2.45± 0.592	M
13	Drinking carbonated drinks (*r*)	7	58	35	1.72± 0.587	M
14	Consume food during TV watching or talking on phone (*r*)	41	39	20	2.33± 1.311	M
15	Consume fast foods (r)	12	55	33	2.22± 0.629	M
16	Consume pickles (r)	27	35	38	1.89± 0.803	M
17	Consume fats a lot (r)	1	43	56	2.55± 0.520	M
18	Consume sweets a lot (r)	11	45	44	2.25± 0.702	M
19	Adding salt during eating (r)	56	34	10	1.54± 0.673	H
20	Taking chips and nestle (r)	8	42	50	1.58± 0.638	M
21	Feels comfortable when you eating alone (r)	12	2	82	1.26± 0.661	H

Cut-off point: 1 – 1.67 = Low, 1.68 – 2.33 = Moderate; 2.34 – 3.00 = High. M= Moderate; H = High; L = Low,(r) =reversed item; DH=Dietary Habits (*r*) = reversed item; Ass.= assessment.

Table 4 describes that the healthy dietary habits for the pregnant women are low for the items 2 and 1 respectively and their unhealthy dietary habits are low for the items 21, 19, and 11 respectively.

Discussion

Analysis of diabetic pregnant women's food frequency intake presents that the vast majority of them have moderate level (n=97; 970%) which means that their intake is moderate within the recommended values (Table1). This can be attributed to the fact that these women have no health-related awareness which can positively affect their food frequency intake and it can reflect the reality that such women didn't receive the required health education related to nutrition during pregnancy, and their knowledge about practices could be attained through advice of older women in the family or other family members.

Concerning the diabetic pregnant women's food frequency intake for the food groups, the study depicts that the diabetic pregnant women consume a lot of bread but little of groat, lattice, corn and macaroni (Table 2). White bread is considered food that have high glycemic index (GI) level of 70 to 99. Carbohydrates that are digested fast and broken down have a high glycemic index, as they release the glucose into the blood in a fast manner. This food should be avoided by the diabetic patient [(6)]. This can be interpreted in a way that bread is present almost with all families' main meals, and the use of other form of grains either in snacks or in social occasions.

In a study which has been done on pregnant women with gestational diabetes in Australia and New zeland, It is found that higher grain intake is not significantly associated with intake of any micronutrients [(7)].

Regarding fruits group, diabetic pregnant women consume orange mainly. While, they consume other fruits, such as clementine, lemon, pomegranate, dates, apple, and banana in moderate quantities (Table2). Orange falls in a glycemic index range of 56 to 69. These are said to have medium GI levels [(6)]. This can be attributed to the availability and low cost of orange and the other stated fruits are convenient to these women's families. The high cost for peach and lack of knowledge about its benefits could make its consumption less than other types of fruits.

Pertaining vegetables group, diabetic pregnant women consume little amounts of coriander, spinach, chard, turnip, cauliflower, carrots, and hot pepper (Table 2). Green beans, carrots, broccoli, cauliflower, lettuce and tomatoes are some of the low glycemic index vegetable, foods with low glycemic index release glucose in a slow and steady manner thereby prove to be helpful in diabetic diets. It is also important with respect to weight management and

heart problems. The glycemic index diet increases the energy levels, and thereby improves the metabolism [6]. Tomato is available almost with all families' cook and main meals. Such dietary pattern is inherited through generations, and those women have lack of knowledge about the nutritional value of the other types of vegetables like coriander, spinach, chard, turnip, cauliflower, carrots, and hot pepper.

With respect to milk and milk derivatives, pregnant women consume more frequently full cream milk and semi creamy milk. While, they consume less yogurt (Table 2). Whole-fat yogurt contains saturated fat, which can increase their chance of developing atherosclerosis. Choosing reduced–fat plain yogurt, without added fruit, eliminates both added sugar and some or all of saturated fat. Plenty of imported milk derivatives products are available in local markets with low prices which are affordable.

In relation to meats and other kinds of protein, pregnant women's consumption to all types of meat, besides egg is at moderate level. But consumption of white meat is higher than red meat which is good for them. Red meat is more expensive than white meat nationwide. So, it is affordable. Thus high levels of daily egg consumption may be deleterious for diabetes risk, as has been suggested for cardiovascular risk in diabetic patients of the same cohorts [8].

Relative to egg consumption, results of the study present that about half of the diabetic pregnant women consume egg five times a week, which is a lot (Table 2).

With reference to legumes group, diabetic pregnant of the present study consume less frequently broad beans, phaseolus, mungo and kidney bean, legumes are food with low GI. Low glycemic index diet decreases the pangs of hunger, thereby prevents excessive eating. It also maintains the insulin and blood glucose levels. It decreases the risk of obesity, cardiac diseases and diabetes [6]. As mentioned previously, these women's families depend mainly on white meats and eggs as sources of protein, and possibly they think that white meat and eggs had more nutritional value than broad beans, phaseolus, mungo, and kidney bean.

Concerning drinks, diabetic pregnant women in the present study consume tea most frequently, and they consume other drinks like coffee, nescafe, cacao, industrial juices, and herbs (cinnamon, thymus and chamomile) less frequently. Consuming tea is very common and deep-rooted, either with main meals or in other times. Beverages containing simple sugars, such as artificially sweetened

beverages (soft drinks, non-diet colas, sodas) and natural or commercial fruit juices, which are oftentimes sugar-enriched, are prototypes of high-GI foods that are consumed in significant amounts worldwide.

Regarding fats group, diabetic pregnant women consume fatty soup and cooking oil most frequently. While their consumption for margarine and animal butter is inappropriate. Soup is one of the most popular dishes in Al -Amarah City, and the cooking oil is used in almost dishes. Furthermore, there is belief that the food that these women make will have a better flavor if it contains extra amounts of cooking oil without considering its health effects (Table 2). There are certain foods that can increase the glucose levels in the blood stream. Foods to be avoided by diabetic patient include food with high fat content, oily and fried food, salt, sugar, whole milk products, red meat, starchy foods, coffee and tea and foods with high glycemic index like bananas, breads, carrots, potatoes and white rice [6].

National Institutes of Health (NIH) recent results of a large observational cohort also suggest that a diet low in carbohydrate and high in protein, with a fat content of nearly 40% of energy, does not increase diabetes risk and may even lower it when vegetable instead of animal sources of fat and protein is consumed [9].

Pregnant women should select products for their daily diet in such a way that it contains 9 servings of the group of products containing carbohydrates, 4 servings of vegetables, 3 servings of fruit, and 3 servings each of dairy products, and containing meat, fish, eggs and nuts, and sporadically, fats and sweets [10] .

The vast majority of diabetic pregnant women have moderate level of dietary habits. As being pregnant and diabetic they need to follow healthy dietary habits in good level manner (Table 5).

Healthy dietary habits that include consumption of a lot of leafy vegetables, eating salad with every meal, having three meals a day, having breakfast almost every day and eating meals with the family members. The last two habits are culturally-driven and inherited through generations, where the local and subsequent generations belief that taking breakfast and taking three main meals are necessary to handle hard tasks. Eating with family members increases their feeling of being more relaxed and comfortable, where this could also present the strength of social and family relations in Al-Amarah City.

Regarding unhealthy dietary habits for diabetic pregnant, drinking tea two hours after meal is found to be the first on the list, where the vast majority of families in AL-Amarah City drink tea immediately after meals. Because of the high-fat diet, people belief that taking tea after meals directly can dissolve fats and make them feel more comfortable. Concerning drinking tea with saccharin, the vast majority of families in Al-Amarah City used to drink tea with sugar, and there is a belief that saccharin is indicated for individuals with diabetes mellitus only. Other unhealthy dietary habits which has been experienced in a considerable level is drinking tea while eating or immediately after eating, and consuming food through watching TV.

More important than isolated foods or nutrients, the study of complete dietary patterns represents the most adequate approach to assess the role of diet on the risk of diabetes. The assessment of whole dietary patterns has become instrumental in nutritional epidemiology. The rationale for this concept is that synergistic or antagonistic effects may exist between the different components of a food pattern [(11).]

Upon the early stated interpretation of the study findings, we can conclude that the vast majority of diabetic pregnant women have acceptable level of food frequency intake and dietary habits. Such findings are inconsistent with a study in which nutrient intakes are compared to Nutrient Reference Values (NRV) for women with gestational diabetes in Australia and New Zealand. The study finds that the majority of women (66%-99%) does not meet the NRV and exceeds NRV for saturated fat and sodium [(7)] . Another study which has been done on 125 pregnant women with gestational diabetes aims to investigate the nutritional intake of these women who have not been provided with nutritional education. Analysis of the values indicates that the majority of the subjects does not meet recommended intake levels for most micronutrients and consumed an undesirable ratio of macronutrients, specifically a higher percentage of total carbohydrates than the current recommendation level [(12)].

For being pregnant with diabetes, good level of nutrition pattern is required and recommended food frequency intake and healthy dietary habits should be maintained. So, they can go through healthy and safe pregnancy and labor and having a healthy baby free of complications.

Recommendations:

1. Establishing standardized educational programs for the diabetic pregnant women that provide them with an education model concerning healthy nutrition during

pregnancy which is necessary for assuming optimal level of management within parameters of their disease process.

2. Collaboration and coordination should be initiated between Institute of Nutritional Research and Diabetic and Endocrine Center in Al-Amarah City concerning the diabetic pregnant women and their dietary pattern.

3. Further study can be conducted on a large sample size and nation-wide base.

4. Further research can be carried out regarding nutritional pattern of diabetic pregnant and its impact upon pregnancy outcome.

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