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Research Article

Dietary Therapy Treatment for Overt Diabetes and Gestational Diabetes: A Review of the Literature

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Abstract

Objective: The objective of the present study is to describe the dietary therapy treatment for overt diabetes and gestational diabetes by means of a literature review.

Methodology: articles between (2011) and (2018) were included in the review. The information collected was from the database, Google Scholar, Capes Periodicals Portal, and on the website of the Brazilian Diabetes Society, on the WHO website using the descriptors: gestational diabetes; nutritional treatment; treatment.

Data synthesis: The manuscript proposes to update the dietary treatment for diagnostic diabetes in pregnancy and gestational diabetes.

Conclusion: The results of the articles demonstrate that women with gestational diabetes mellitus need to be monitored by a multidisciplinary team. It is important for pregnant women to undergo nutritional therapy even in the postpartum period to maintain the blood glucose goal. Based on the scientific articles studied, it can be concluded that diet and physical activity are essential for the control of Gestational Diabetes Mellitus.

Keywords: Gestational Diabetes; Nutritional Treatment; Treatment

Introduction

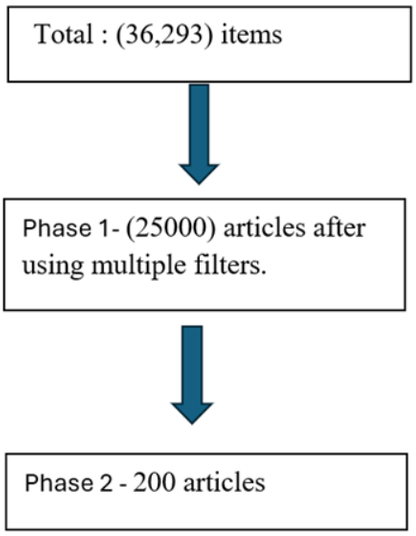
Diabetes Mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia and other complications, which may result from defects in insulin secretion or action [1]. "Diabetes mellitus first diagnosed in pregnancy is termed (Overt Diabetes). The concept of Gestational Diabetes Mellitus (GDM) is hyperglycemia first detected during the gestational-puerperal period with blood glucose levels that do not reach the diagnostic standards for Diabetes Mellitus (outside the pregnancy-puerperal period) [2].

It is important for pregnant women diagnosed with GDM to receive nutritional therapy to control blood glucose during pregnancy, and in the puerperium, to avoid complications for the pregnant woman and the fetus [3]. The objective of this study was to review scientific articles on the relationship between diet and glycemic control in pregnant women with gestational diabetes mellitus. Still, it is justified to perform this because Diabetes Mellitus is a common physiological alteration in pregnancy, which affects (3-25%) of pregnancies. The initial treatment for GDM is dietary guidance and adjustment in the pregnant woman's diet. This helps to maintain adequate weight gain during pregnancy and maintain blood glucose control, in addition to avoiding fetal macrosomia and other complications associated with GDM for the pregnant woman and the fetus.

Methodology

This article is a Literature Review. The selection of studies was carried out from the following databases: Google Scholar, WHO, NCBI, SBD Archives, CAPES Journals. The indexing term was: "gestational DM nutrition", "gestational diabetes feeding", "resistance insulin pregnancy", "diabetic pregnancy dietotherapy", "nutritional therapy of gestational diabetes mellitus", "diet in glycemic control in pregnant women with Diabetes Mellitus", "diet pregnancy diabetes", "nutritional management gestational diabetes", "gestational diabetes", "gestational diabetes carbohydrate count", low carbohydrate diet and Gestational "Diabetes Mellitus Treated with Diet, From the research, it was observed the occurrence of (36,293) articles in total. Of these, references (36) were used in the review. On Google Scholar using the DECS "diet pregnancy diabetes" were

found, (24800) results in total. Using the indexing term "gestational diabetes mellitus", 287 results were found, totaling 25087. Of these, articles were discarded in (phase 1) (25000) because they did not meet the selection criteria after reading the title and filters were used (articles that did not meet the theme of the review), Research not carried out in humans, pharmacological treatment for gestational diabetes, non-original articles, to reduce the number of selectable articles.



Of these, 200 articles were selected for (phase 2) and from these, after reading, articles were selected.

Of these (4520) were discarded in (phase 1) after reading the title because they did not meet the selection criteria for the article. The (phase 2) (203) articles were translated and the titles were read and finally [4,5].= articles were selected for review.

In the NCBI database, (6003) articles were found, in total (phase 1) (5050) articles were discarded. They then went to (phase 2) (953) articles and from these (10) articles were selected for review.

In the SBD Archives, (454) results were found using the "gestational diabetes" indexer, of which (449) were excluded in (phase 1), of which they went to (phase 2) (4) and these (10) articles were used in the review. A total of 10 articles from the World Health Organization (WHO) were used. (1) book was used as a reference, this book was read the complete chapter on GDM.

The objective of this article was to present and discuss scientific articles on the relationship between diet and glycemic control of gestational diabetes mellitus through original articles.

In this way, the articles were read, selected and organized in ascending chronological order after reading the titles. Articles from (2011 to 2018) were selected to analyze how research has been over these [6-8]. years on the theme of Nutritional Therapy for GDM. Thus, throughout the article, the most important results of the selected articles are presented for the theme of the review. And finally, conclude what research currently shows in (2018) about GDM.

Results

Tables 1 and 2 of the Literature Review data sources are organized in tables 1 and 2, organized in chronological order from (2011 to 2018).

Study	Year	Type of Local Study	Magazine
04	2011	Hospital das Clínicas de Minas Gerais.	Journal of Medicine of Minas Gerais.
05	2014	Observational study in 10 Mediterranean cities.	European Journal of Clinical Nutrition.
06	2016	Case report in the maternity ward of the University Hospital of Maceió.	GEP NEWS, Maceió.
07	2018	Australian Longitudinal Study	Br J Nutr.
08	2018	Retrospective study	J. Perinat. Med

Table 1: Data sources that present studies on the relationship between diet and glycemic control in pregnant women with Diabetes Mellitus regarding the type of study, place of conduction and Journal in which they were published, in the period from (2011 to 2018).

Author	Year	Objectives	Study population	Period	Results	Conclusion
04	2011	To assess the presence of risk factors, type and response to treatment, incidence of maternal, fetal and perinatal complications, and persistence of postpartum diabetes.	66 pregnant women with GDM from the Hospital das Clínicas de Minas Gerais.	John 2007 to Dec. 2008.	Metabolic control was not satisfactory. .31 pregnant women (47%)	The study population had poor metabolic control due to the low socioeconomic level of the pregnant women attended.
05	2014	To explore a possible relationship between the incidence of GDM and the dietary pattern of the Mediterranean diet (DM).	In 10 Mediterranean countries, 1,076 pregnant women had a glucose OGTT of 75 g at 24 to 32 GI. Eating habits were assessed by a questionnaire.	-	The incidence of GDM was lower in individuals with DM.	Adherence to a Mediterranean dietary pattern is associated with a lower incidence of gestational diabetes.
06	2016	To present a proposal for an individualized nutritional intervention implemented in a pregnant woman with DM2 assisted in the maternity ward of the University Hospital of Maceió	A 22-year-old pregnant woman with a gestational age of 29 weeks with previous DM2 was present.	05 to 21 Nov 2016.	Pharmacological and nutritional treatments were implemented simultaneously, given the patient's severe metabolic lack of control.	Nutritional treatment combined with pharmacological treatment has positive results in controlling the patient's weight and glycemic values.
07	2018	To examine the association of carbohydrate quantity and quality in the pregestational diet with the risk of developing gestational diabetes mellitus (GDM)	3607 women aged 25 to 30 years without diabetes.	-	During 12 years of follow-up (2003-2015), 285 cases of GDM (4 · 6%) were reported in 6263 pregnancies among 3607 participants.	Higher fiber intake could lower the risk of GDM. It is especially important to consider the source of carbohydrates
08	2018	To compare fetal brain structures evaluated in routine USG examinations during the 2nd and 3rd of pregnant women with GDM and without GDM.	231 pregnant women with GDM.	2001-2017 of a hospital in Germany.	The mean widths of the septum pellucidum and lateral ventricles of the brain were larger in fetuses of mothers with GDM.	GDM is associated with altered fetal brain development.

Table 2: Scientific articles that present data sources on the relationship between diet and glycemic control in pregnant women with Diabetes Mellitus in the period from "2011 to 2018".

Discussion

Nutritional Treatment

Nutritional treatment is the first treatment measure for GDM [9].

The distribution of macronutrients is (40 to 45%) carbohydrates, (15 to 20%) proteins (at least 1.1 g/kg/day) and (30 to 40%) lipids. It is also important to distribute macronutrients in 6 meals/day in the diet throughout the day to avoid glucose peaks and hypoglycemia or ketosis. There are usually 3 main meals interspersed with 3 healthy snacks [10].

There is no specific amount of macronutrients for women with GDM, it is recommended to use recommendations for pregnant women from the Dietary Reference Intakes (DRI), at least (175 g) of carbohydrates, (71 g) of protein, and (28) grams of fiber. Vitamins and minerals are also according to the DRIs for pregnant women [11].

The Brazilian Diabetes Society recommends in its latest Guideline that the caloric value for pregnant women with (GDM) macronutrients be distributed as follows: (15% to 20% protein), (40% to 55%) carbohydrates and (30% to 40%) lipids. And it is important to divide it into 6 meals/day as follows: breakfast (10%), morning snack (10%), lunch (30%), afternoon snack (10%), dinner (30%), supper (10%) [12].

As for the use of sweeteners, there are still few studies that prove the safety of the use of sweeteners in pregnancy. Aspartame, acesulfame-K, saccharin, and sucralose can be used sparingly [13].

In a research conducted on the glycemic index of bread and pasta, the authors state that bread and pasta have an effect on the overall glycemic index when compared to other foods. The authors recommend the intake of fiber, whole foods, fruits, and vegetables for the person with DM [13].

It is also emphasized that the importance of the amount of total carbohydrates in the diet is more important than the source and type of carbohydrate. Diet control in GDM is to achieve the maternal glycemic goal with an adequate nutritional outcome, with gestation lasting from (39° to 41°) weeks and the baby being born between (3 and 4 kg).

The authors also state that a nighttime snack is necessary to prevent ketosis during the night and it is necessary that glucose is always monitored. Thus, the pregnant woman in the 2nd and 3rd trimester needs a protein intake of 1.0g + (19g) additional protein. The diet is normolipidic, normoglycidic and normoproteic [14].

In a research a Food Pyramid was developed for eutrophic pregnant women aged (19 to 30) years with portions recommended by the Food Guide of the Brazilian Population, for the development of the pyramid, the author was based on two food plans: one of (2,188 kcal) referring to the (1st) gestational trimester and another of (2,502 kcal) for the (2nd and 3rd) gestational trimesters. For overweight and obese pregnant women, the use of this food pyramid is not indicated, as well as the type of carbohydrate consumed and the presence of fiber in the diabetic pregnant woman's diet needs to be considered [16,17].

Micronutrients (calcium, magnesium, selenium, zinc and vitamin D) also interfere with insulin resistance, as they act on glycemic homeostasis [18].

The meal plan for pregnant women with GDM must be individualized, carbohydrate counting can be performed. The dietitian needs to be aware of changes in the bolus/carbohydrate ratio throughout the day for patients using insulin. The caloric value is calculated according to BMI and be classified according to the chart for pregnant women. The practice of physical activity should also be encouraged [18-20].

In a study in which 66 patients diagnosed with GDM were followed up at the Endocrinology and Metabolism Service of the Hospital das Clínicas da (UFMG), the patients were guided weekly by the nutrition team, with diets of (30 kcal/kg of ideal weight). Of the (66) pregnant women (35%) had different degrees of pre-gestational obesity. After pregnancy (13%) had class III obesity. In this study, metabolic control was unsatisfactory, only 31 pregnant women (47%) were treated only with diet. Insulin treatment was required in (36) patients (53%), of whom 7 used 1 dose of insulin, 11 used 2 doses, and (17) of them used 3 doses or more of insulin per day. Of these (66), patients (18%) remained with diabetes in the postpartum period. Due to the scarcity of resources in public health, primary care and delay in referral to reference centers [21].

In a survey carried out in hospital obstetric centers in 10 Mediterranean countries (Algeria, France, Greece, Italy, Lebanon, Malta, Morocco, Serbia, Syria and Tunisia**),** 1076 pregnant women were studied and their eating habits were evaluated through a questionnaire based on the Mediterranean food pyramid. The aim of the research was to evaluate the association between nutrient intake, individual intake, and the pattern of food intake of the Mediterranean diet and the development of GDM. In this study it was observed that the group with GDM that had better adherence to the Mediterranean diet had a better glucose tolerance. In hypothetical hypothesis, Mediterranean diet in pregnancy may improve glucose tolerance and decrease, to some extent, the incidence of GDM in pregnant women [22].

Nutritional therapy in GDM is the cornerstone of treatment for GDM. Carbohydrate is the main component that alters postprandial blood glucose levels, so the amount and type of carbohydrate are important, especially foods that are sources of fiber and carbohydrates with a low glycemic index [23].

The only treatment that will reach all women with GDM is diet therapy. Therefore, a diet based on complex carbohydrates and with a low glycemic index, low in lipids and with an appropriate amount of protein in the diet, helps to maintain adequate blood glucose levels and supply the nutrients necessary for a healthy pregnancy [24].

Early treatment of GDM reduces the risk of maternal-fetal complications. Treatment for GDM should be multidisciplinary, and includes changes in lifestyle, physical activity, diet, and pharmacological treatment if necessary. Drug treatment is the secondary treatment for pregnant women who do not achieve glycemic control only with diet and physical activity. The gold standard for drug treatment of GDM is insulin [25].

In research on the type and source of carbohydrate ingested in the pre-gestational period, it was concluded that GDM can be prevented mainly if the woman consumes fiber during pregnancy [26].

Treatment for GDM begins with diet and nutritional counseling. For the authors, 50% of pregnant women with GDM can be treated only with diet. The other half will probably need pharmacotherapy [27].

In an open-label, randomized, controlled trial with a total of (152) women with GDM. The pregnant women were instructed to follow a low-carbohydrate diet (40%) or (50%) The food record was made through a diary of 3 consecutive days. The following result was obtained: the control group that followed the low-carbohydrate diet did not reduce the need for insulin during pregnancy [28].

A randomized trial conducted with pregnant women with GDM to investigate the influence of a low glycemic index diet on the postprandial glucose levels of these pregnant women. For 5 days they followed a diet with a low glycemic index. They then obtained the following result: after the dietary intervention, the control group that received the diet with a low glycemic index had significantly reduced postprandial glucose values when compared to the other group that did not go on a diet [29,30].

Another study conducted at the Maternal Primary Care Center at Guangdong General Hospital, China, with (95) pregnant women with GDM. In this study, they were divided into two groups, a control group received an individualized diabetes diet and another group received a low glycemic index diet with intensive caloric intake control, to evaluate whether a diet with a low glycemic index interferes with glycemic control and the level of lipids in the mother's blood.

The results obtained were positive, the group that received the low glycemic index diet for two weeks had better blood glucose and blood lipid control, when compared to the other group that received a diabetes diet without glycemic index control of food [31,32].

In a retrospective study conducted in Japan with pregnant women with GDM. In this study, women were divided into 3 groups according to pre-pregnancy BMI. Of these women, 426 were classified as overweight and (372) as obese. Women with GDM with obesity during pregnancy had large-for-gestational-age (LGA) newborns. The study suggests that medical and nutritional interventions in obese pregnant women and those with GDM contribute to reducing the incidence of newborns Large for Gestational Age [33].

In a study with (231) fetuses of women with GDM between (20° and 41°) weeks of gestation. It was verified through ultrasonography that GDM can cause changes in the brain development of the conceptus. In this study, the width of the septum pellucidum and the lateral ventricles (VL) of the brain were larger in the fetuses of diabetic pregnant women (Figure 3), the size of the septum pellucidum is (5.68 mm and the VL is 8.41 mm). When the normal is (3.29 mm) for the septum pellucidum and (5.39) mm for the VL. Of these (231) pregnant women in the study, (61) were only treated with diet, (82) were treated with insulin [35].

During labor, it is necessary to monitor capillary blood glucose every hour. If general anaesthesia is administered, capillary blood glucose should be monitored every 30 minutes. After removal of the placenta, intravenous insulin should be reduced by at least 50%. After childbirth, an additional snack may be necessary, especially for breastfeeding. Capillary glucose should be monitored 1 hour before and 1 hour after the meal within 24 hours after delivery. Women who have had previous DM can continue taking Metformin after delivery [36].

Final Considerations

The results of the articles demonstrate that women with GDM need to be monitored by a multidisciplinary team. It is important for pregnant women to undergo nutritional therapy even in the postpartum period to maintain the blood glucose goal. Based on the scientific articles studied, it can be concluded that diet and physical activity are essential for the control of GDM.

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