DETERMINING FACTORS AND CONTROL OF GESTATIONAL DIABETES IN PATIENTS OF THE HOSPITAL UNIVERSITÁRIO DE JUNDIAÍ, SP

Rafaela Fernandes Silva[1], Ana Beatriz Carollo Rocha-Lima[1*], Denise Aparecida Gonçalves de Oliveira[1], Érika Simone Lopes[1], Gilberto Ranalli Aparecido[1], Cláudia de Moura[1], Daniel Thome Catalan[1], Veronica Gomes Cristina Soares[1], Sabrina de Almeida Marques[1]

recebido em 20/08/2020
aceito em 19/11/2020

[1] Instituto de Ciências da Saúde – Universidade Paulista-UNIP (*campus* Jundiaí).
*Autor de Correspondência: Ana Beatriz Carollo Rocha-Lima
Endereço: Universidade Paulista - UNIP, campus Jundiaí, Instituto de Ciências da Saúde. Avenida Armando Giassetti, 577 – Vila Hortolândia – Trevo Itu/Itatiba – Jundiaí-SP, CEP 13214-525
Telefone: (11) 4815-2333
E-mail: abeatrizcrl@gmail.com

Abstract: Objective: To identify the determinant factors reported by pregnant women with Gestational Diabetes Mellitus (GDM) of the Hospital Universitário de Jundiaí-SP, as well as to know the control measures adopted by the population sampled. Methodology: a standard questionnaire was applied to 20 pregnant women with GDM to evaluate the conditions of diagnosis, the pre-determinant factors of GDM, the non-drug control measures adopted and the therapy used post-diagnosis. Results: the most significant aspects in the sampled public were the history of diabetes mellitus in the family, the lack of knowledge about the disease before acquiring it and lack of physical exercise. The most frequent control measures were the realization of diet, glycemic monitoring and non-abuse of fatty foods. Conclusions: the previous lack of knowledge of gestational diabetes mellitus combined with family history can be determining factors for the incidence of the disease.

Key words: Hyperglycemia, diabetes mellitus, gestational risk factors.

FATORES DETERMINANTES E CONTROLE DO DIABETES GESTACIONAL EM PACIENTES DO HOSPITAL UNIVERSITÁRIO DE JUNDIAÍ, SP

Resumo: Objetivo: Identificar os fatores determinantes relatados por gestantes com Diabetes Mellitus Gestacional (DMG) do Hospital Universitário de Jundiaí-SP, bem como conhecer as medidas de controle adotadas pela população amostrada. Metodologia: foi aplicado um questionário padrão a 20 gestantes com DMG para avaliar as condições de diagnóstico, os fatores pré-determinantes do DMG, as medidas de controle não medicamentosas adotadas e a terapia utilizada pós-diagnóstico. Resultados: os aspectos mais significativos no público amostrado foram a história de diabetes mellitus na família, o desconhecimento da doença antes de adquiri-la e a falta de prática de exercícios físicos. As medidas de controle mais frequentes foram a realização da dieta alimentar, o monitoramento glicêmico e o não abuso de alimentos gordurosos. Conclusões**:** o desconhecimento prévio sobre diabetes mellitus gestacional aliado à história familiar podem ser fatores determinantes para a incidência da doença.

Palavras-chave: Hiperglicemia, diabetes mellitus, fatores de risco gestacionais.

INTRODUCTION

Insulin is the hormone responsible for transporting the sugar (glucose) ingested through food into the cells, and is produced by the beta cells of the pancreas. When there is a deficiency in its production or its action, the glucose accumulates in the blood, generating a hyperglycemic state and causing Diabetes mellitus (DM). The most common and common types of DM are type 1, which develops through the immunological destruction of pancreatic beta cells, and type 2, which is caused by insufficient production of insulin by the pancreas or when the body becomes sensitive to insulin action (insulin resistance) (GUYTON, 2002). Another existing type of MD is Gestational Diabetes mellitus (GDM), which today may be considered a worldwide epidemic and a major public health challenge and, consequently, a major issue in modern obstetrics. If it is not properly treated, GDM can lead to congenital anomalies, spontaneous abortions and increased risk of macrosomia, respiratory distress syndrome in the fetus and preeclampsia, and may progress to type 2 diabetes in parturient and fetal death (AYACH *et al*., 2010; LIRA, DIMENSTEIN, 2010; TIEU *et al*., 2014).

GDM is one of the most frequent complications of pregnancy, becoming year after year a pathogenesis of great importance in scientific studies and modern obstetrics. Pregnant women who develop GDM have an increased risk of becoming type 2 diabetic over a lifetime. Studies conducted by the Brazilian Society of Endocrinology and Metabolism reveal that in the USA, about 135,000 new cases were diagnosed each year, with a worldwide prevalence in low-risk populations ranging from 1.4% to 2.8% and prevalence in high-risk populations among 3 , 3% to 6.1%. In Brazil, prevalence ranges from 2.4% to 7.2% (MIRANDA, REIS, 2008).

GMD develops due to the action of hormones that reduce the action of insulin, thus generating maternal insulin resistance. One of the main hormones that causes this resistance is the human placental lactogen (HPL), responsible for the development of the fetus. However, hyperglycemic hormones such as cortisol, estrogen, prolactin and progesterone are also involved in insulin resistance in GDM (KUMAR, 2005; OGLE, 2013; SOKUP *et al*., 2014). In view of this, the maternal pancreas starts increasing insulin production to compensate for the frame. This process leads to the reduction of pancreatic beta cells, reducing insulin production and thereby increasing blood glucose levels, a process that culminates in GMD (KUMAR, 2005; OGLE, 2013).

In addition to the physiological processes, pre-determinant factors such as obesity, age over 25 years, family history and systemic arterial hypertension contribute to the evolution and/or aggravation of the disease (MIRANDA, REIS, 2008; SIMON, MARQUES, FARHAT, 2013). Obesity in pregnancy is one of the main risk factors for GDM, as it can increase up to eight times the tendency of pregnant women to develop gestational diabetes in comparison to normal-weight pregnant women, in addition to increasing the indication of cesarean section and elevation in incidence of macrosomia, since the levels of lipids in the maternal circulation are great indicators of fetal size (GONZÁLEZ *et al*., 2012; WAHABI *et al*., 2014).

Usually the pregnant woman does not present symptoms in GDM, but when these are present, they are usually: fatigue, polyuria, polydipsia (feeling of excessive thirst) and weakness (MIRANDA, REIS, 2008).

DMG is also commonly associated with vitamin A deficiency, which is responsible for acting on the retina and body tissues, systematically maintaining cell integrity and growth. This deficiency is caused by hyperglycemia, which causes an imbalance in the transport of the vitamin carried by the retinol bound to the protein RBP (retinol-binding protein). Thus, impairment of the amount of this vitamin to the fetus causes it to have a limited stock of vitamin A and become vulnerable, increasing the risk of morbidity, mortality, and blindness (LIRA, DIMENSTEIN, 2010).

Adequate early diagnosis for GDM helps to keep gestation away from fetal risks such as death, and maternal diabetes type 2 after pregnancy. The diagnosis is made in two phases: the first is the screening, performed through anamnesis to verify the maternal pre-determinant factors and fasting glucose test. If the result is equal to or greater than 125 mg / dl, it is considered as positive screening, and the second confirmatory phase, performed at the 24th week of gestation by oral glucose tolerance test (OTTG) or glycemic curve, in which the pregnant woman is submitted to an overload of 75 g of glucose and the result is obtained through cut-off points. After one and two-hour fasting of glucose overload, certain glycemic values will be expected; if two or more values are elevated, the diagnosis of GDM is confirmed (MIRANDA, REIS, 2008; FRANCISCO, TRINDADE, ZUGAIB, 2012).

At the end of 2009, results from HAPO and other studies were submitted to evaluation by the *International Association of Diabetes and Pregnancy Study Groups* (IADPSG), generating an agreement published in March 2010 and defining that the 75g glucose TOTG test is the best choice as a diagnosis for GDM, and that the test should be performed in all pregnant women at the 24th and 28th week of gestation. It was also recommended that, depending on the risk factors of the pregnant women, they should, at the first prenatal visit, be submitted to the measurement of plasma glucose to identify undiagnosed diabetes carriers (Overt Diabetes) and GDM (FRANCISCO, TRINDADE, ZUGAIB, 2012).

n January 2011, the American Diabetes Association (ADA) adopted the new recommendations disabling the 100g OTTG and proposing to follow the criteria put in place by the IADPSG. In April 2001, the Obstetric Clinic Division of the Hospital das Clínicas of the Medical School of the University of São Paulo (HC-FMUSP) began to adopt these criteria for diagnosis of the disease (FRANCISCO, TRINDADE, ZUGAIB, 2012).

The first GMD treatment option is nutritional therapy (diet) avoiding excessive weight gain from the determination of adequate nutritional value for each pregnant woman, followed by mainly aerobic physical exercises: arm ergometry and inclined ergometry with bicycle, both performed three times a week, reduce blood glucose in pregnant women with GDM (BURROW, FERRIS, 1996; PADILHA *et al*., 2010; SHANSHAH, MIDDLETON, CROWTHER, 2012).

Drug treatment, usually with insulin, is indicated if GDM is severely decompensated or when diet and exercise alone can not control the disease, but studies indicate that when the pregnant woman makes use of exogenous insulin, the placenta tends to have a significant increase in weight and fetuses tend to show an increase in their growth (ARSHAD, KARIM, HASAN, 2014).

Prenatal follow-up of pregnant women with GDM is done through metabolic monitoring and monitoring of fetal growth. Metabolic monitoring aims at the confirmation and adequacy of the pregnant woman to the treatment through the evaluation of the capillary glycemia when waking, before lunch and dinner, and postprandial in 1 or 2 hours daily. Fetal growth monitoring evaluates fetal response to maternal glycemia and can be estimated by ultrasonography of fetal girth from the 28th week of gestation, with repetitions every two to four weeks (WEINERT *et al*., 2011).

Therefore, the general objective of the present study was to identify the determinant factors reported by pregnant women with Gestational Diabetes Mellitus (GDM) at Hospital Universitário de Jundiaí-SP, as well as to know the control measures adopted by the population sampled.

METHODOLOGY

A qualitative, descriptive and cross-sectional study was carried out at the University Hospital in the city of Jundiaí-SP, using a questionnaire containing 12 questions to 20 pregnant women with gestational diabetes mellitus.

Data collection through the use of questionnaires performed with pregnant women with GDM sought to obtain the relationship between ages, gestational period and risk factors, such as obesity, addressing the risks and complications for both mother, fetus and perinatal women, raising awareness of the importance of diagnosis and treatment:

1. Age:
2. Gestational Period:
3. In what gestational period did you receive the diagnosis of GDM?
4. Were you aware of the disease before acquiring it?
5. Do you have hypertension?
6. Do you have a history of gestational diabetes in the family?
7. Do you have a family history of diabetes mellitus?
8. If so. Who?
9. Do you exercise?
10. Do you do or abuse fatty foods?
11. Do you have a proper diet for weight control?
12. Do you monitor blood glucose?
13. Do you use medications to control diabetes?

Pregnant women less than 18 years of age were excluded from this study. The questionnaires were not answered by pregnant women without the described disease. They volunteered to participate in the research, signing a free and informed consent form and being exempt of any cost and damage to health. Based on the answers obtained through the questionnaires performed with 20 pregnant women with GMD at the University Hospital of Jundiaí - SP, a graphic representation was performed.

This study was submitted and approved by the Research Ethics Committee of the Paulista University no. CAAE: 30466414.2.0000.5512, approval number: 655.498.

RESULTS AND DISCUSSION

The 20 pregnant women with GMD interviewed were between the ages of 19 and 39 years. The mean age was 27.9 years and the most affected age group was between 21 and 25 years (40%), followed by the age group between 26 and 30 years (30%) (Figure 1a). The literature shows that the age group most prone to the development of GDM is over 25 years (SIMON, MARQUES, FARHAT, 2013); however, among the pregnant women surveyed in the present study, the disease affected mainly younger women.

Most of the pregnant women (55%) were diagnosed with GDM in the first trimester of pregnancy (Figure 1b). Generally the diagnosis of GDM is performed as early as the first months of gestation because the screening test is performed at the first prenatal visits and confirmation is performed between the 24th and the 28th week of gestation, since the earlier the diagnosis , the greater the chances of the pregnant woman presenting a pregnancy with minimal risks of complications.

Most of the pregnant women (65%) stated that they did not know the GDM before receiving the diagnosis (Figure 1c). With previous knowledge about the disease, even pregnant women who have the pre-determinant factors can avoid the evolution of the disease through the adoption of healthy habits, such as diet and physical exercises right in the beginning of pregnancy. These measures tend to maintain your normal glucose levels, avoiding hyperglycemia.

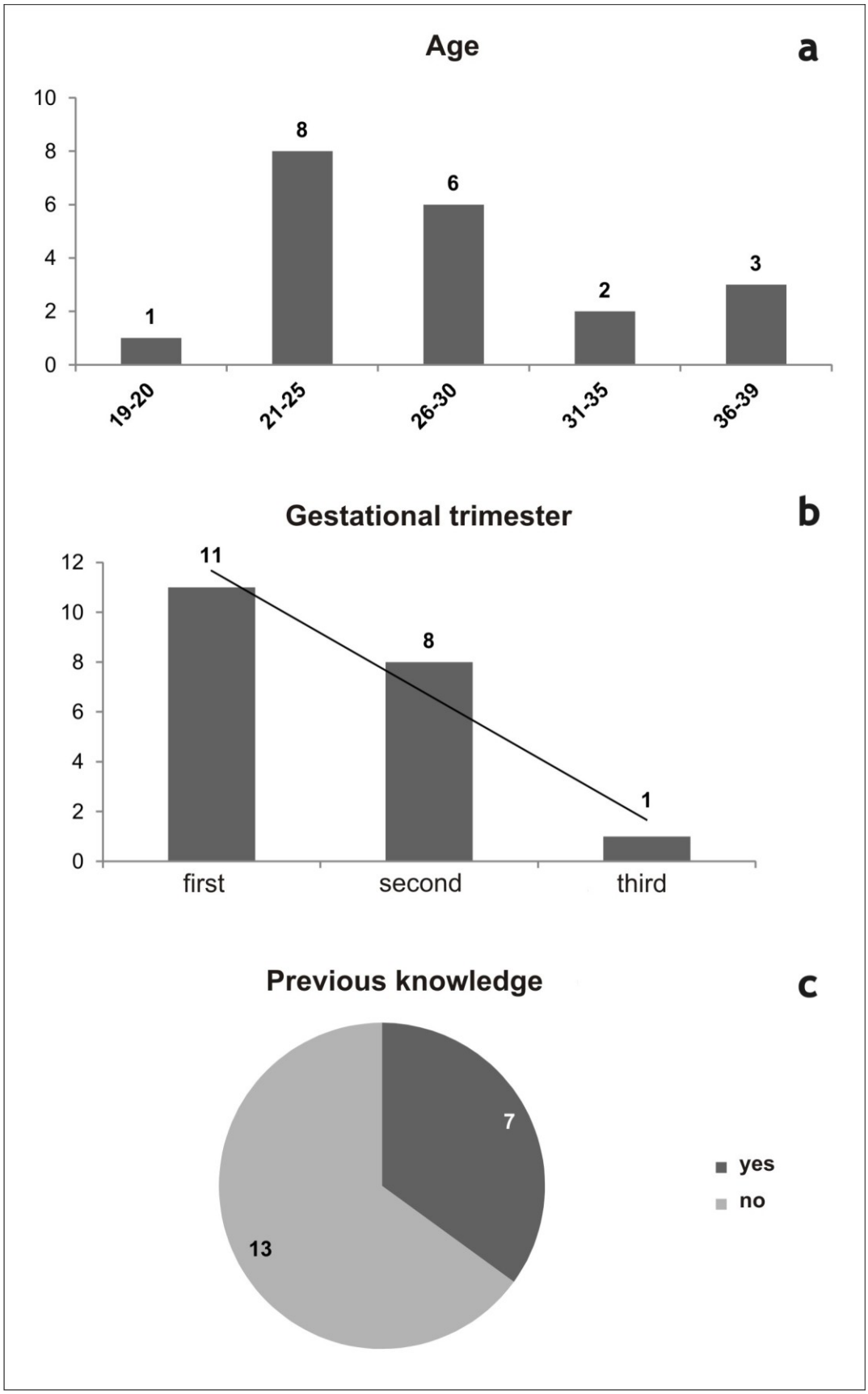


Figure 1: Conditions of the volunteers interviewed, in relation to age, gestational trimester and knowledge in relation to pathology. At the time of diagnosis of GDM.

Of the 20 pregnant women, 6 (30%) were hypertensive and 14 (70%) were not (Figure 2a). The pre-determinant factors of GDM and hypertension are shared, as in the case of obesity and sedentary lifestyle, so pregnant women who have GDM if they do not have adequate treatment may progress to hypertension and pregnant women who already have hypertension due to the pre-determinant factors may develop GDM.

Of the total sample, 17 pregnant women (85%) reported no family history of GDM, and 3 (15%) reported having family history (Figure 2b). The history of GDM in the family is usually not presented by the pregnant women with the disease, since the disease has a greater relation to the pregnant woman's lifestyle and other pre-determinant factors, such as obesity, age greater than 25 years and history of DM in the family. GDM occurs only during pregnancy, at the end of the cause there is no progression.

Of the total sampled, 15 pregnant women (75%) reported having a history of type 2 DM in the family and 5 (25%) stated that they did not have a history (Figure 2c). The history of type 2 DM in the family has a great contribution to the development of the disease, because being a genetic disease, these pregnant women are prone to the evolution of DM and GDM when pregnant.

Of the 15 pregnant women who reported having a history of diabetes mellitus in the family, 7 (46%) said they were the mother, 3 (20%) said they were the grandparents, 2 (13%) said they were the father, 1 (7% the great-grandmother, brother and uncle (Figure 2d). When the family member who has DM history is a first-degree member as a parent, grandparent, and the willingness to progress to DM, and GDM is increased by the genetic factors involved.

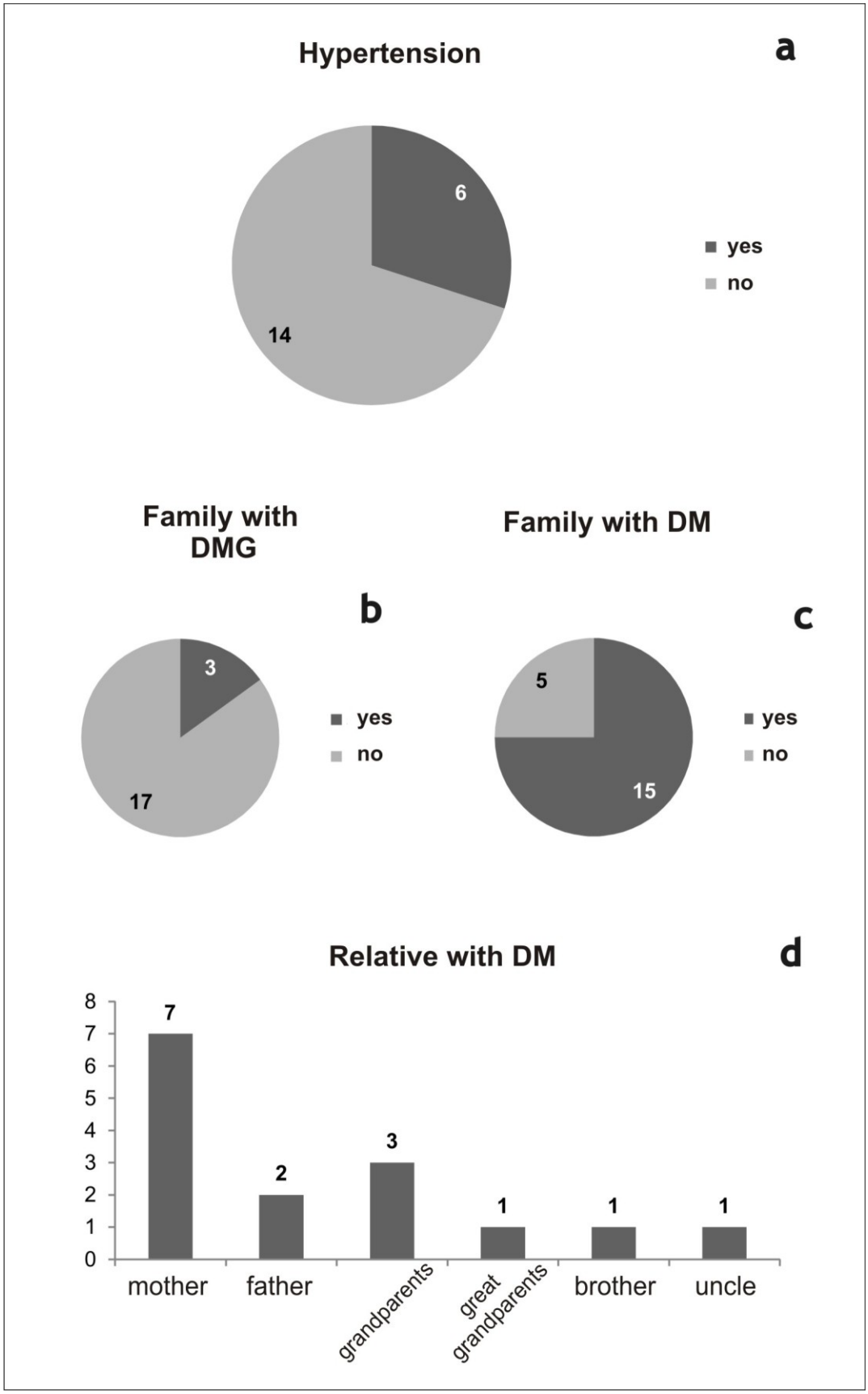


Figure 2: Pre-determining factors for the development of GDM.

Among the volunteers 11 (55%) stated they did not perform physical exercises and 9 (45%) stated they performed (Figure 3a). Performing physical exercises, especially aerobics, helps lower blood glucose levels, thus improving the clinical status of pregnant women, preventing them from having decompensated GMD.

Of the interviewees 12 (60%) did not perform fatty food abuse and 8 (40%) reported they did it (Figure 3b). The abuse of fatty foods mainly in pregnant women with a history of DM in the family increases the chances of acquiring GMD, but when the pregnant woman already has the diagnosis of GDM, the incidence of fetal macrosomia is increased, since the glucose, nutrient and lipids in the maternal circulation are largely responsible for fetal size.

Of all the patients, 13 (65%) stated that they were on a weight-control diet and 7 (35%) stated that they did not diet (Figure 3c). The diet contains the correct amount of calories for each pregnant woman according to the progression and progression of GMD. Helps maintain weight control of the pregnant woman and decrease the risk of fetal macrosomia.

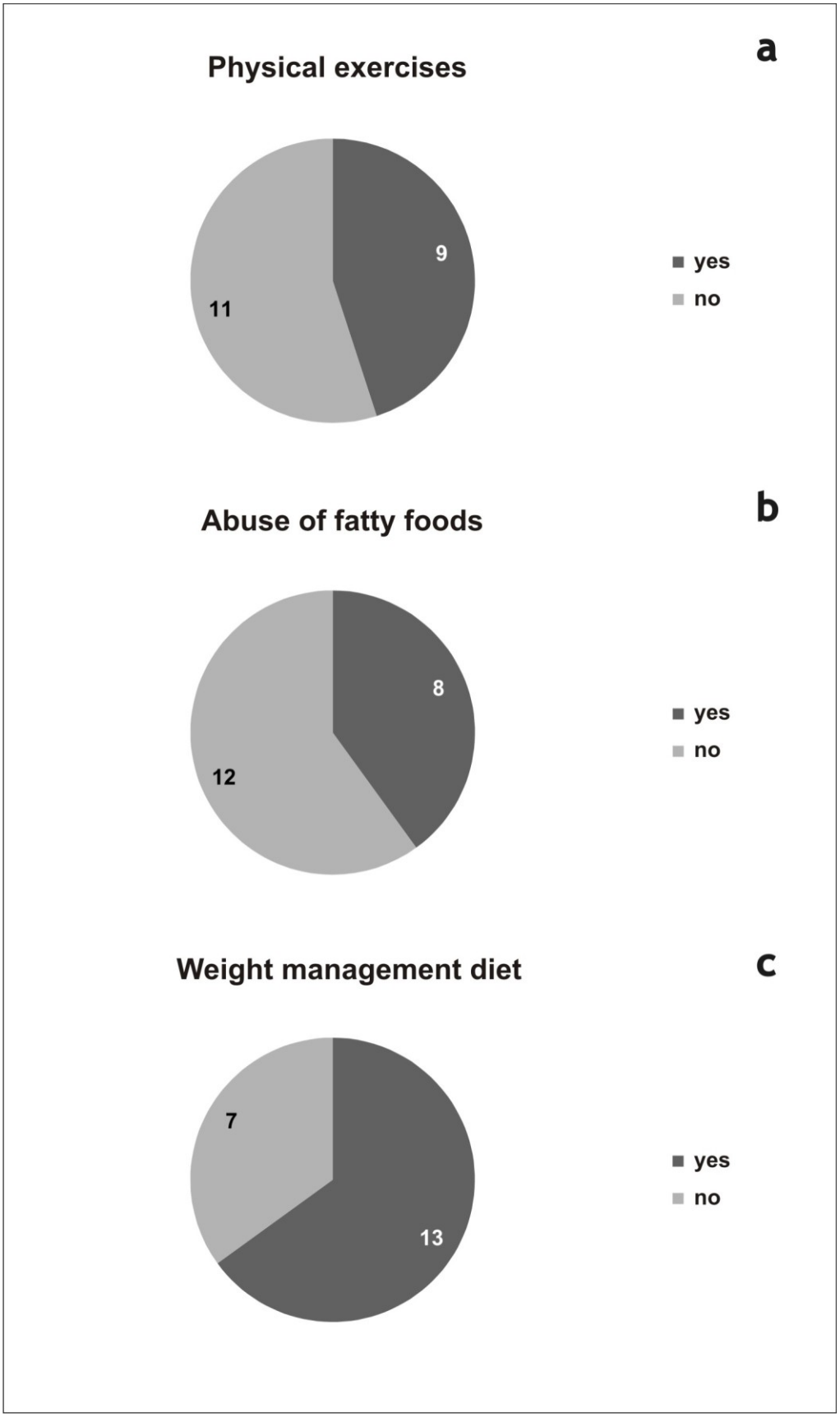


Figure 3: Non-drug control measures performed for volunteers with GMD.

Of the total of 20 pregnant women, 12 (60%) stated that they underwent glycemic monitoring and 8 (40%) said they did not perform it (Figure 4a). Glycemic monitoring is very important in GMD, because through this the pregnant woman can monitor if there is an evolution and aggravation of the disease (if the value of the glycemia tends to increase) and verify if the treatment is being effective to decrease the glucose. Monitoring could be performed through laboratory tests such as fasting glucose and / or right-handed testing.

Of the total of 20 pregnant women, 13 (65%) stated that they did not use medications and 7 (35%) said they were pregnant, with insulin being the main drug used (Figure 4b). The use of medications in pregnant women with GDM can be excluded in pregnant women who tend to maintain a balanced diet and regular physical exercise (3x per week), but when GMD remains unmanaged, medication use is necessary in order to control the glycemic level.

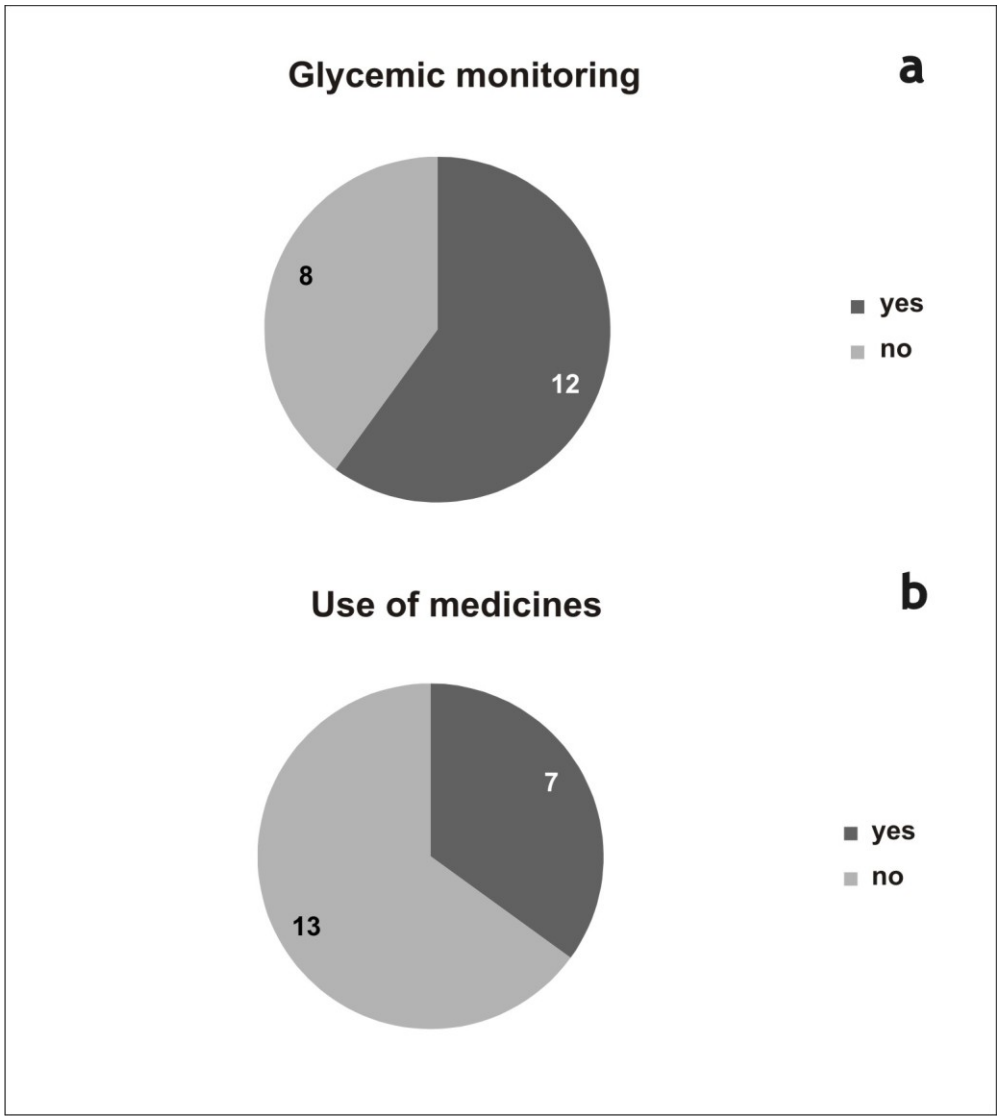


Figure 4: Therapeutics used for the control of GMD in volunteers interviewed at the Hospital Universitário de Jundiaí-SP.

CONCLUSIONS

The main risk factor presented in this study was the history of DM in the family, with 75% of the pregnant women and the lack of prior knowledge of GMD with 65% of the pregnant women. The most evident forms of GMD control were 60% glycemic monitoring of pregnant women, diet with a percentage of 65% and physical exercises with 45%. The main preventive measure for GMD is prior knowledge of the disease, but these measures could be performed by only a minority (35%) of the pregnant women interviewed, since the great part 65% did not know the disease before acquiring it.

REFERENCES

GUYTON AC. Tratado de fisiologia medica. Rio de Janeiro: Editora Guanabara Koogan; 2002.

AYACH W, CALDERON IMP, RUDGE MVC, ARAÚJO RA. Costa Comparação entre dois testes de rastreamento do diabetes gestacional e o resultado perinatal. Revista Brasileira de Ginecologia e Obstetrícia. 2010. 32, (5), 222-228.

LIRA LQ, DIMENSTEIN R. Vitamina A e diabetes gestacional. Rev. Assoc. Med. 2010.56, (3), 355-359.

TIEU J, MCPHEE A.J, CROWTHER C.A, MIDDLETON P. Triagem e subsequente gestão para gestacional diabetes para melhorar a saúde materna e infantil. Cochrane Database Syst Rev. 2014; 2 (CD007222).

OGLE C. Parteiras College of Utah. Gestacional Diabetes: riscos reais para além da controvérsia. Midwifery Today Int Parteira. 2.013.(108): 57-8.

KUMAR V. ROBBINS E COTRAN. Bases patológica das doenças. Rio de Janeiro: Editora Elsevier; 2005.

SOKUP A, CIASTEK RB, SADŁECKA MW, GRABIEC M, ROSC D. Diabetes Mellitus Gestacional piora o perfil de marcadores de risco cardiometabólico e Índices diminuição da função Beta-Cell Independentemente de resistência à insulina em não diabéticos mulheres com história familiar de diabetes tipo 2. Journal of Diabetes Research. 2014. (8, Artigo e743495)

MIRANDA PAC, REIS R. Diabetes mellitus gestacional. Rev. Assoc. Med. 2008.54, (6), 477-480.

SIMON CY, MARQUES MCC, FARHAT HL. Glicemia de jejum do primeiro trimestre e fatores de risco de gestantes com diagnóstico de diabetes melito gestacional. Revista Brasileira de Ginecologia e Obstetrícia. 2013.35 (11), 511-515.

GONZÁLEZ MA, FERNÁNDEZ AR, QUINTANA VO, OLIVERAS LV. O estado nutricional de mulheres com diabetes gestacional e características de recém-nascidos. ALAN. 2012.62, (4), 38-43

WAHABI HA, FAYED AA, ALZEIDAN RA, MANDIL AA. Os efeitos independentes da obesidade materna e diabetes gestacional na gravidez resultados. BMC Endocrine Disorders. 2014, 14: 47.

FRANCISCO RPV, TRINDADE TC, ZUGAIB M. Diabetes gestacional, o que mudou nos critérios de diagnóstico?. Revista Brasileira de Ginecologia e Obstetrícia. 2011.33, (8), 171-173.

PADILHA PC, SENA AB, NOGUEIRA JL, ARAÚJO RPS, ALVE PD, ACCIOLY E, SAUNDERS C. Terapia nutricional no diabetes gestacional Revista de Nutrição. 2010.23, (1), 95-105.

SHANSHAH H, MIDDLETON P, CROWTHER C. Exercício para mulheres grávidas para prevenir a diabetes mellitus gestacional. Cochrane Database of Systematic Reviews. In: The Cochrane Library. 2012. (7).

BURROW NG, FERRIS FT. Complicações clínicas durante a gravidez.Editora ROCA, 1996

ARSHAD R, KARIM N, HASAN AJ. Efeitos da insulina na placenta, evolução materna e fetal no diabetes mellitus gestacional. Pak J Med Sci 2014. 30, (2), 240–244.