

CASE REPORT

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Effect of interruption in sedentary behavior on glycemic control in gestational diabetes

Efecto de la interrupción en la conducta sedentaria sobre el control glicémico en la diabetes gestacional

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ABSTRACT

Physical activity produces beneficial effects in pregnant women. In spite of this, most of them present high levels of sedentary behavior. The objective of the study was to demonstrate the effect of a break in sedentary behavior on metabolic control in a 36-year-old patient with gestational diabetes. The intervention consisted of reorganizing her daily routine and performing a sedentary behavior break protocol. The patient achieved optimal metabolic control after the beginning of the intervention and until the end of pregnancy. The sedentary behavior break protocol added to the reorganization of the patient's routine proved to be effective in achieving glycemic control and avoiding complications associated with gestational diabetes.

Key words: Pregnancy, Diabetes, gestational, Sedentary behavior, Exercise

RESUMEN

La actividad física produce efectos benéficos en la mujer embarazada; a pesar de ello, la mayoría presentan altos niveles de conducta sedentaria. El objetivo del estudio fue evidenciar el efecto del quiebre en la conducta sedentaria sobre el control metabólico en una paciente de 36 años con diabetes gestacional. La intervención consistió en reorganizar su rutina diaria y realizar un protocolo de quiebre en la conducta sedentaria. La paciente logró un control metabólico óptimo luego del comienzo de la intervención y hasta el final del embarazo. El protocolo de quiebre en la conducta sedentaria sumado a la reorganización en la rutina de la paciente resultó ser efectivo para lograr el control glicémico y evitar complicaciones propias asociadas a la diabetes gestacional.

Palabras clave. Embarazo, Diabetes gestacional, Conducta sedentaria, Ejercicio

INTRODUCTION

Gestational diabetes (GD) is one of the most frequent complications during pregnancy⁽¹⁾. Worldwide prevalence is estimated to be close to 18%⁽²⁾. More recent studies show figures between 8-26%, always associated with the age variable as a determinant parameter of higher prevalence^(3,4).

GD is defined as any degree of glucose intolerance that manifests itself or is detected during pregnancy. For its diagnosis, fasting glycemia values between 100-125 mg/dL on 2 different days are considered. If the values are higher than 125 mg/dL, it is considered that the patient probably had pregestational alterations⁽⁵⁾. The second parameter to be considered for the diagnosis of GD is glycemia 2 hours after glucose load (75 g); values greater than or equal to 140 mg/dL are considered altered and allow the diagnosis of GD^(5,6).

The treatment of GD consists of nutritional counseling, promotion of regular physical activity (PA), rigorous monitoring of the fetus and, only when the expected glycemic control is not achieved, drug treatment is resorted to^(7,8).



Regarding PA recommendations for 2020, the WHO⁽⁹⁾ describes that pregnant women should perform at least 150 minutes (min) of aerobic physical activity of moderate intensity. In addition, she should limit the time spent in sedentary behaviors (SB) by interrupting them even with light intensity physical activities.

SB is understood as the time spent performing activities with the minimum energy cost (1-1.5 MET (unit of measurement of the metabolic rate; 1 MET corresponds to 3.5 mL O₂/kg x min) during the waking period⁽¹⁰⁾.

In 2017, Fazzi⁽¹¹⁾ showed that pregnant women spend more than 50% of their waking time in SB. On the other hand, the American Diabetes Association establishes that pregnant women with GD or at high risk of presenting it should perform breaks in their sedentary behavior (BSB) every 30 min, practicing light exercise for at least 3 min⁽¹²⁾. It is interesting to highlight some research such as that of Fritschi⁽¹³⁾ who found that each minute in SB of a person with diabetes causes an increase of 0.12 min in hyperglycemia during the day.

In view of the above, several international entities have reached consensus on the importance of interrupting SB to improve glycemic homeostasis^(14,15).

We would like to report the results of a retrospective case study in which BSB was performed, in order to see how simple strategies can be used to achieve better metabolic control in patients with GD.

CASE REPORT

A 36-year-old woman, 24 weeks gestation and with no history of disease presented for medical evaluation in the 24th week of pregnancy weighing 60 kg, height 1.67 m, body mass index (BMI) 21.5 kg/m². She was seen at a private health center in Santiago de Chile and underwent fasting glycemia and glucose afterload tests (75 g). The results were as follows: fasting glycemia 100 mg/dL and afterload (2 h) 222 mg/dL, HbA_{1c} 7.3% and in accordance with glycemia parameters. The patient was diagnosed with gestational diabetes⁽⁵⁾ and was referred for nutritional counseling.

From day 1 of her GD diagnosis, the patient was asked to rigorously record her self-assessed glycemia with hemoglycemic tests (Accu-Chek Guide model), with fasting and postprandial (60 and 120 min) samples taken at the three main meal times (breakfast, lunch, dinner). She was also asked to carefully record her daily food intake, which was monitored by a nutritionist, and she was instructed on her new diet. The patient maintained her pre-GD physical activity levels.

The nutritional indications focused on maintaining 5 meal times with snacks, and reinforcing that the carbohydrates consumed were high in fiber and did not exceed 75 g per meal (whole wheat bread, brown rice, corn). The importance of consuming carbohydrates in small quantities, but necessary to avoid ketosis, was emphasized. The patient's body mass index was evaluated throughout the pregnancy, showing a normal weight gain, since she started the pregnancy with 59 kg and ended with 67 kg, i.e., she had a total weight gain of 8 kg.

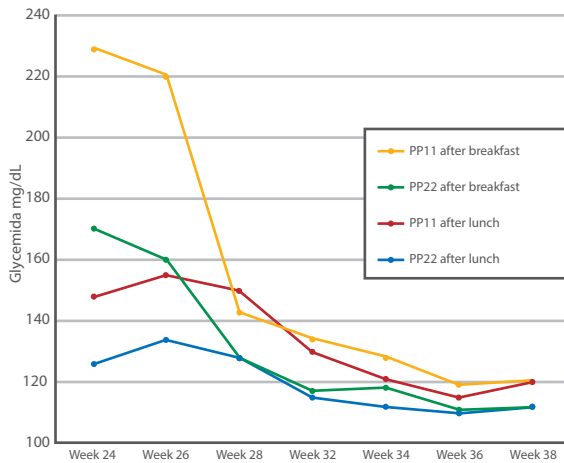
Regarding medical treatment, all the results obtained were evaluated by her attending physician during monthly check-ups until the 7th month and biweekly check-ups until the time of delivery (Figure 1). The patient did not receive any pharmacological treatment at any time during pregnancy and after being diagnosed with GD; neither was it necessary to prescribe any medication. The patient attended her medical check-up in week 26 and her glycemic control was not optimal after breakfast and lunch, in spite of complying with the nutritional recommendations (Figure 1).

Because of the above, the physician insisted that she make a change in her daily routine regarding her physical activity levels, in particular, her SB. He insisted that she should take breaks from SB and reorganize her daily routine (Figure 2).

As for the intervention with SB breaks in the patient and reorganization of her daily routine every morning, it was structured as follows: she had to drive for 60 min to get to work, so she was instructed NOT to have breakfast at home, but 10 min before arriving at work. She was emphatically prescribed to perform SB breaks every 30 min, throughout the day, according to



FIGURE 1. WEEKLY RECORD OF POSTPRANDIAL GLYCEMIA CONTROLS.



Dempsey protocol⁽¹⁴⁾. This protocol consisted of BSB every 30 min, where the person should stand and perform 1 min of walking in place, 1 min of squats and 1 min of plantiflexion (total 3 min of exercise). It is important to mention that it was explained to the patient that the squats are at medium height and at tolerance, in order not to generate discomfort. The suggested routine was started at week 26 + 3 (Figure 2).

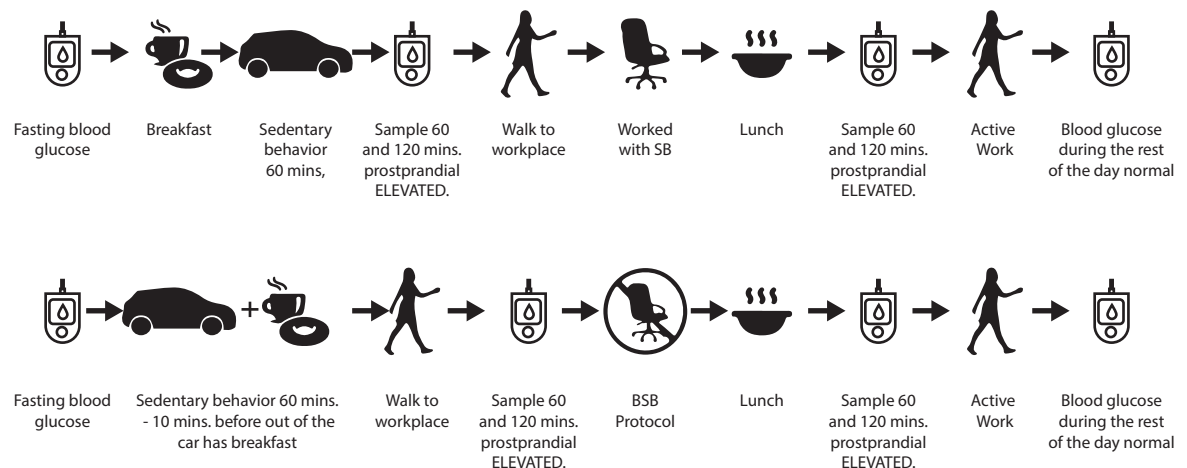
The patient's metabolic control showed a favorable evolution reflected in the HbA1c samples collected after the intervention since week 26, which showed a clear decrease of 5.1% in week 38 of gestation. This demonstrated optimal metabolic control and was in accordance with international recommendations to keep it under 5.5%^(5,6). Regarding the postprandial capillary glycemia samples, for all feeding times, it is possible to visualize the decreases presented

since the intervention performed on the patient, maintaining in the last weeks of gestation values lower or equal to 120 mg/dL (Figure 1). As for the record of complications or unwanted effects due to the intervention, the patient did not report any. At week 38 (+1 day), the baby was delivered without complications, with the birth of a healthy female baby, who did not present hypoglycemia at birth; she was normal weight (3.060 kg) and had a height of 49 cm.

DISCUSSION

Exercise in pregnant women has important effects on insulin sensitivity, glut4 expression and improvement in glucose uptake⁽¹⁶⁾. In this regard we can refer to the meta-analysis published by Tobias⁽¹⁶⁾, where the results reaffirm the fact that it improves metabolic control in pregnant women who maintain physical activity programs. However, there is very little evidence of control through BSB in this population. Regarding the BSB and its benefits, this variable has a high level of evidence⁽¹⁴⁻¹⁷⁾ that is consistent with the glycemic control found in this case. Studies show a reduction in complications and weight management in type 2 DM patients, but not in the specific case of gestational diabetes. In GD, to date there is only the article published by Wagnild⁽¹⁸⁾ in which the time that pregnant women maintained sedentary behavior and its incidence was evaluated, finding a significant association between women with higher SB and the incidence of GD ($p < 0.05$). In addition, pregnant women who performed BSB had better fasting and postprandial glycemic control ($p < 0.05$).

FIGURE 2. ROUTINE PRE- AND POST-INTERVENTION RECORDING.





In conclusion, reorganization of the physical activity routine and sedentary behavior in patients with respect to their eating schedules and intervention with breaks in sedentary behavior are simple, inexpensive and feasible strategies to prescribe to pregnant women. These sedentary behavior breaks can be implemented with self-monitoring after receiving simple and easily understood instructions for the general population, strategies that can produce significant and beneficial physiological effects in pregnant women with gestational diabetes.

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