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**ORIGINAL**

# Impact of Preventive and Mandatory Social Isolation in the control of type I diabetes in adults in the Buenos Aires Metropolitan Area

## Impacto del Aislamiento Social, Preventivo y Obligatorio en el control de la diabetes tipo I en adultos del Área Metropolitana de Buenos Aires

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## ABSTRACT

**Introduction:** the measures taken by the Argentine government to avoid contagion of the SARS-CoV-2 virus consisted in what was called Preventive and Mandatory Social Isolation (Aislamiento Social Preventivo y Obligatorio, ASPO), which was established on March 20th of 2020. The disposition restricted medical checkups and physical activity for several months and modified the population's eating habits. Diabetes Mellitus (DM) is a high incidence and prevalence pathology worldwide. While the majority of the patients suffer from DM II, the percentage of DM I and its peculiarities make worth an analysis regarding the COVID-19 pandemic.
**Methods:** assessing the impact of ASPO on the metabolic control of patients who live in the Buenos Aires Metropolitan Area (AMBA) during the period March-December 2020.
**Results:** of the 45 subjects involved in the study, 42,2 % saw an increase in their HbA1c level, did not know the value, or did not get tested. This is a situation of clinical interest for a more exhaustive follow-up. In addition, 60 % of the total gained weight and 38 % decreased the frequency of physical activity, while 35 % did not perform any activity at all. Furthermore, 73,3 % reported having experienced anxiety, 64,4 % apathy, and 60 %, sadness.
**Conclusion:** the impossibility of carrying out ordinary activities, the suspension or reduction of frequency of physical exercise, and the increase and modification of the quality of meals with the resulting weight gain had an impact on the rising of HbA1c levels during the Preventive and Mandatory Social Isolation.

**Keywords:** Type 1 Diabetes; Isolation; COVID-19; Eating Habits; Physical Activity.

## RESUMEN

**Introducción:** las medidas adoptadas por el gobierno argentino a fin de evitar contagios del virus SARS-CoV-2, versaron sobre lo que se denominó Aislamiento Social Preventivo y Obligatorio (ASPO), establecido el 20 de marzo de 2020. Esto restringió, durante varios meses, consultas médicas, actividad física y modificó los esquemas alimentarios en la sociedad en general. La diabetes mellitus (DM) es una patología de alta incidencia y prevalencia a nivel mundial. Si bien el mayor número de pacientes padecen DM II, el porcentaje de DM I y las particularidades de esta, ameritan un análisis de situación con respecto a la pandemia de COVID-19.
**Métodos:** conocer el impacto del ASPO en el control metabólico de los pacientes con DM I que habitan el AMBA durante el período marzo-diciembre 2020.
**Resultados:** en 45 casos estudiados, dentro del período analizado, el 42,2 % aumentó su valor de HbA1c o desconoce su valor o no realizó el estudio. Esta situación reviste interés clínico para un seguimiento más exhaustivo. Además, el 60 % del total aumentó su peso corporal y un 38 % disminuyó la frecuencia en la práctica de actividad física, mientras un 35 % no realizó ninguna actividad. Además, el 73,3 % manifestó haber sufrido angustia, el 64,4 % desgano y el 60 % sintió tristeza.

**Conclusión:** la imposibilidad de realizar actividades cotidianas, la suspensión o descenso en la frecuencia del ejercicio físico, el aumento y modificación de la calidad de las ingestas de alimentos con el consecuente aumento de peso, tuvieron incidencia en los aumentos de los valores de las HbA1c durante el Aislamiento Social Preventivo y Obligatorio.

**Palabras Clave:** Diabetes Tipo I; Aislamiento; Covid-19; Conducta Alimentaria; Actividad Física.

## INTRODUCTION

On March 20th of 2020, the Argentine government established the Preventive and Mandatory Social Isolation (Aislamiento Social Preventivo y Obligatorio, ASPO) through the Emergency Decree (DNU) Nº 297/20,[1] with the intent of avoiding a health crisis due to the pandemic caused by the SARS-CoV-2 virus. The measure stated that all of the so-called "non-essential" activities, as listed in the regulation, would be restricted. This meant that only the workplaces specified in the articles could be attended to, and public circulation should be avoided with the exception of strict cases, such as the purchase of food, medicines, assistance to emergency health centers, or assistance of elderly and/or disabled people. Since DM was classified as a risk pathology, patients were suggested to comply with the measure and avoid contact with people who were not from their family group. Adhesion to the national regulation from the Autonomous City of Buenos Aires and the Province of Buenos Aires administrations emphasized the importance of staying at home until the number of infections decreased. The situation extended until November 29th, 2020 with measures that were progressively adjusted to the health situation of the moment. Openings and closures of establishments were decided based on a system of phases that stipulated what activities were allowed and how they were to be conducted, as determined by the Ministry of Health through daily case reports (figure 1). On November 30th, Argentina began the Preventive and Mandatory Social Distancing (DISPO), which enabled free public circulation, while still maintaining the hygiene measures enforced by the ASPO (mandatory use of masks, applying of gel or spray hand sanitizer before entering stores, reduced capacity in enclosed facilities).

| | 1. Strict isolation | 2. Administrative isolation | 3. Geographic segmentation | 4. Progressive reopening | 5. New normal |
|---|---|---|---|---|---|
| Authorized | Only essential services | New authorization | Province exceptions | Province exceptions | With hygiene habits and sustained care |
| Prohibitions | All the rest | National prohibitions | National prohibitions | National prohibitions | |
| Population mobility | Up to 10% | Up to 25% | Up to 50% | Up to 75% | More than 75% |
| Doubling time of cases | Less than 5 days | 5 to 15 days | 15 a 25 days | More than 25 days | |
| Geographic | Homogeneous | National exceptions | Segmentation by epidemiological criteria | Local restrictions | Homogeneous |

**Figure 1.** System representation
Source: National Presidency[2]

In that sanitary context, the daily activities of the population were affected, and, particularly for DM I patients, maintaining metabolic control and respecting its 4 fundamental axes —medication, physical activity, nutrition, and education— could have resulted in an arduous task.

DM is a chronic pathology that is on the rise to such an extent that the WHO classified it as a pandemic. According to a report published by the organization in April 2021, 422 million people suffered from it in 2014, with a higher prevalence rate in low and middle-income sectors.[3]

Given its condition of systemic pathology, diabetes is an important cause of blindness, kidney failure, cardiovascular disease, and limb amputations.

In order to avoid the complications that the disease may produce, many comprehensive therapies were implemented through various investigations.[4] These therapies include medication (with insulins and/or oral hypoglycemic agents), regular monitoring of blood glucose, physical activity, and a balanced diet, according to the needs of the patients, the standards agreed upon and renewed by the American Diabetes Association[5] and the International Diabetes Association, and other entities aimed at monitoring new therapies with the objective of delaying the onset of chronic complications. The use of intensified therapy in patients with DM I resulted in a decrease in the average glycemia levels, which translates into the measurement of lower percentages

of hemoglobin A1c. An adequate and balanced diet, not based on prohibiting the consumption of foods rich in sugars but on the system of counting carbohydrates per portion, and the maintenance of body weight to avoid insulin resistance (whether endogenous or exogenous) also contribute to a more efficient and sustainable treatment.

It should also be taken into account that diabetes is a chronic pathology and, as such, is subject to the patient's emotions, despite maintaining good glycemic profiles. It is convenient to notice the relation between depression and DM to understand that the treatment is not only bound to a numerical issue but that the environmental and ecological variables of the patient can result in the success or not of the transit through the condition.

In Argentina, the health system contemplates the comprehensive treatment of DM through 100 % coverage of supplies and medication, in accordance with some guidelines that, in ordinary situations, are not easy to attend to for the patient who obtains what is necessary through the worker's compensation insurance, paid medical insurance or hospital primary care covered by Act 26,914.[6]

## METHODS

The study is an observational, descriptive, and retrospective one.

Surveys were conducted on patients with DM I from the AMBA who were diagnosed before 2020. The age range was 18-60 years (n=45).

*Exclusion criteria:* patients with DM I who live outside the AMBA, patients with DM I diagnosed during 2020, patients with DM II, patients with gestational DM, patients with LADA DM, and patients under 18 years of age and over 60.

Surveys designed by the author for this work were carried out. The surveys were answered online.

*Variables:*

- V1 Percentage of Glycated hemoglobin (HbA1c) before March 2020
- V2 Percentage of HbA1c in the period March-December 2020
- Weight in kilograms
- Monthly eating habits (quantity and quality of food)
- Weekly frequency of physical activity
- Existence of chronic conditions prior to the ASPO (retinopathy, nephropathy, neuropathy)
- Difficulty in accessing medication and supplies during the ASPO
- Existence of consultations with the treating physician before and during the ASPO
- Existence of consultations with nutritionists during the ASPO
- Emotional aspects during ASPO (fear, sadness, anxiety)

## RESULTS

The sample showed a predominance of patients from Greater Buenos Aires (GBA) and their age range was distributed as follows: 6,7 %, aged between 18-24 years; 35,6 %, aged between 25-35 years; 42,2 %, aged between 36-45 and, finally, 15,6 % aged between 46-60 years. 77,8 % (n=35) of the total population are women. The sample is detailed below in figure 2:

| | | |
|---|---|---|
| **Place of residence** | 57.8% GBA | (n=26) |
| | 42.2% CABA | (n=19) |
| **Age** | 18-60 years old | |
| **Gender** | 77.8% Female | (n=35) |
| | 22.2% Male | (n=10) |
| **Access to medication and supplies** | 55.5% Worker's compensation insurance | (n=25) |
| | 40% Paid medical insurance | (n=18) |
| | 4.4% Public system | (n=2) |
| **Comorbidities** | 4.4% HBP | (n=2) |
| **Chronic conditions until March 2020** | 20% Retinopathy | (n=9) |
| | 6.7% Neuropathy | (n=3) |
| | 6.7% Nephropathy | (n=3) |

**Figure 2.** Clinical characteristics of patients

Before the ASPO decree, 55,6 % of patients attended consultations with their diabetologists more than 3

times a year, 25,6 % between 1-3 times a year, and 8,9 % less than 1 time a year. Due to the impossibility of attending in person, 71,1 % (n= 32) had medical remote consultations.

Regarding physical activity, its weekly frequency was assessed before the ASPO and during it. Variation of the assiduity is represented in figures 3 y 4.

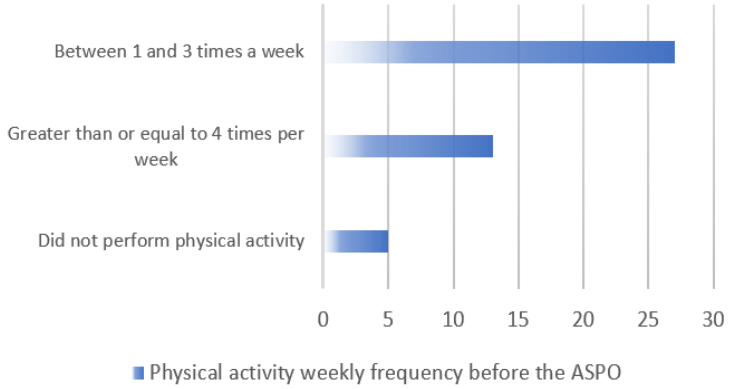


**Figure 3.** Weekly frequency of physical activity before the ASPO

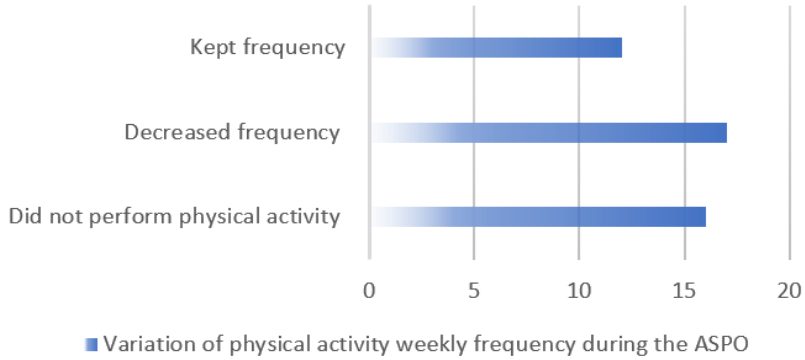


**Figure 4.** Variation of physical activity weekly frequency during the ASPO

Regarding insulin therapy, 68,9 % (n= 31) of patients perform subcutaneous injections using the pen system, 28,9 % (n=13) are insulin micro infusion users, and 2,2 % (n=1) apply insulin with a syringe. In addition, 11,1 % (n=5) use oral hypoglycemic agents in a complementary manner. Regarding glycemic monitoring, 55,6 % take measurements more than 4 times a day, 26,7 % between 3 and 4 times a day, 13,3 % between 1 and 2 times a day, and 4,4 % less than once a day. 75,6 % (n=34) perform glycemic controls through sensors, in addition to using test strips.

Regarding access to medication and/or supplies during isolation, 37, 8 % reported inconveniences in the provision.

75,6 % (n=34) performed glycated hemoglobin A1c tests during the ASPO. A comparison between the determinations before the ASPO and during the ASPO is shown in figure 5. The graph is expressed by number of patients.

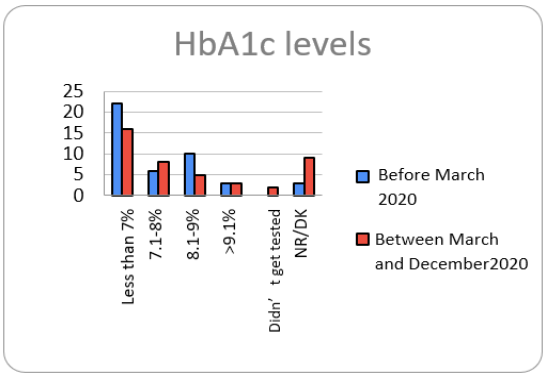


**Figure 5.** HbA1c levels

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From the nutritional aspect, 53,3 % (n= 24) did not consult with nutrition specialists before March 2020 or during isolation. Of the 46,7 % who did consult, only 28,9 % (n= 13) continued to maintain contact with their nutritionist during the ASPO.

When asked about eating habits, 66,7 % reported changes in them during the ASPO. Among them, 40 % noted that those changes were less healthy. 68,9 % (n=31) increased the amount of food intake.

Figure 6 shows the changes in body weight as expressed by the patients:

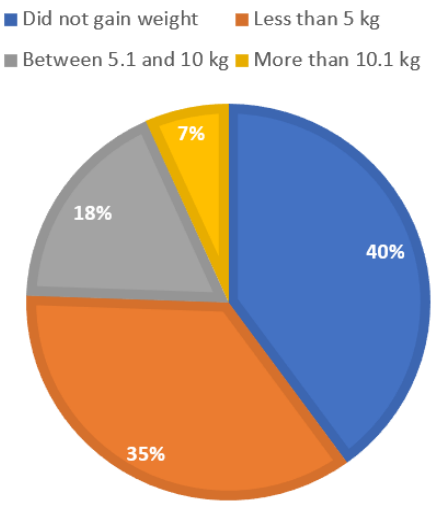


**Figure 6.** Weight gain during March-December 2020

From the mental health perspective, 42,2 % received assistance from a professional, both a psychologist and a psychiatrist, in the period studied. Of that percentage, 15,6 % were prescribed some psychoactive drug. When consulted about moods and emotions, 73,3 % expressed feeling distress, 64,4 % reluctance, 60 % sadness, 60 % had difficulty sleeping, and 44,4 % had difficulty concentrating.

## DISCUSSION

Most studies on metabolic control and diabetes during lockdown were conducted on patients with DM II or pediatric population with DM I, and not a lot on adult patients with DM I.

Of course, the dynamics and variability of the treatment of adult patients with DM I is different from those groups, in such a way that the analyzes account for the diversity of results according to geographic area and age range.

Among studies of interest, we found an article published by the team from the Medical Center in Vila Nova de Gaia, Portugal,[7] which evaluated 241 adult patients with DM I who are treated at that center. This is a detailed study of the variations in HbA1c between December 2018 and July 2020, divided into 4 intervals of time, whose conclusion was that remote work benefited metabolic control in their patients. In the same scheme, but in the pediatric population with DM I, given the studies carried out in Saudi Arabia by the King Fahd University Hospital[8] between October 2020 and February 2021, of 164 cases evaluated, the result was improvements regarding the patient's controls, due to the possibility of parents being more present at times of detection and application of insulin, which they missed during school hours, for example. Similar results were obtained in a multicenter study conducted in Germany[9] on a population of 19,729 pediatric patients with DM I.

An article from the São Paulo State University (UESP)[10] published in October 2020, warned about the importance of physical activity in patients with diabetes and urgently indicated that they should be encouraged to exercise during and after isolation, to prevent not only the chronic complications associated with the illness but also the comorbidities. In concomitance with these warnings, a systematic review published in 2021 by Eberle and Stitchling[11] based on 25 publications about DM I patients, showed that blood glucose levels had increased significantly during lockdowns.

Regarding our study population, the findings showed divergences with respect to the articles cited in previous paragraphs, but they coincide with what the UESP and the Eberle and Stichling review warned. It is of interest to us to expose the relationship between the decrease in the frequency of physical activity, the increase in body weight and the HbA1c levels. Additionally, and in contrast to our results, a systematic review carried out by the University of Qassim, Saudi Arabia,[12] concluded, after evaluating 25 articles of different nature, that there was no marked deterioration in the metabolic control of patients with DM, despite the reduction of physical activity stimuli.

It is also worth mentioning that the importance of mental health has been dismissed, at least, in the first moments of the lockdown, and that all resources were used to prevent infections and deaths from Covid-19 and little effort was destined to protect the population from the consequences. of confinement. The expressed percentages of distress, sadness, and sleep disorders could be taken into account both to understand the absolute values collected as well as to consider a posteriori studies in this area.[13]

Given the peculiarities of the AMBA population with respect to the rest of the country, the duration of the periods of isolation according to geographic areas, and certain singularities pertinent to the Argentine health system, we have the possibility of pointing out the differences with other works and the opportunity to continue investigating and observing study patterns of other centers and the reality of our patients, and considering subsequent studies based on this work.

## CONCLUSION

Although the objective of the ASPO was to avoid the collapse of the health system at a time when increases in cases were registered and there was no vaccine available against SARS-CoV-2, complications resulting from poor metabolic control of diabetes, a situation that was well known and studied at the time, was failed to be foreseen. In that period, a decrease or abandonment of physical activity, an increase in body weight, changes in the eating patterns, changes in the emotional state of the patients, and difficulty in accessing supplies and medications were observed. This impacted directly the variation of the HbA1c determinations obtained, producing a decrease in the number of patients who maintained their values in a range of less than 7 %, and an increase in the number of patients who either registered higher values or who could not perform controls due to the 2020 health situation. Taking into account the aforementioned variables, it is relevant to highlight the importance of interdisciplinary treatment of DM in order to achieve along with the patient a metabolic control that provides a good quality of life, appropriate to their needs.

The results of this study can collaborate as a background, should a similar situation occur in the future.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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*Writing - revision and editing:* Maria Isabel Morgner, Lorena Djament.