



# LIFESTYLE MEDICINE APPLIED TO LATE COMPLICATIONS OF DIABETES MELLITUS.

MEDICINA DE ESTILOS DE VIDA APLICADO A COMPLICACIONES TARDÍAS DE LA DIABETES MELLITUS.  
REPORTE DE CASO

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## ABSTRACT

**Introduction:** Diabetes mellitus is the main cause of progression of chronic kidney disease and dialysis. The therapeutic intervention considers an HbA1C level that avoids adverse effects associated with hypoglycemic therapy, as occurs in patients with chronic kidney disease, despite not reaching normoglycemia. **Clinical Case:** The present case describes an intervention based on Lifestyle Medicine in a patient with diabetic nephropathy and chronic kidney disease, whose biomarkers showed improvement in kidney damage due to reduction of proteinuria or reduction of HbA1C, LDL and triglycerides in its metabolic control. **Conclusion:** The intervention with lifestyle medicine requires a multidisciplinary approach and the time of intervention does not discriminate a degree of chronic kidney disease that limits its intervention

**Keywords:** Lifestyle Medicine, diabetic nephropathy: (Source: Mesh – NLM)

## RESUMEN

**Introducción:** La diabetes mellitus es la principal causa de progresión de la enfermedad renal crónica y diálisis. La intervención terapéutica considera un nivel de HbA1C que evite efectos adversos asociados a la terapia hipoglicémica como ocurre en el paciente con enfermedad renal crónica, pese a no se alcance la normoglicemia. **Caso Clínico:** El presente caso describe una intervención basada en Medicina de Estilos de Vida en un paciente con nefropatía diabética y enfermedad renal crónica, cuyos biomarcadores mostraron mejoría en daño renal por reducción de la proteinuria o reducción de HbA1C, LDL y triglicéridos en su control metabólico. **Conclusión:** La intervención con medicina de estilos de vida requiere un enfoque multidisciplinario y su momento de intervención no discrimina un grado de enfermedad renal crónica que limite su intervención.

**Palabras clave:** Medicina de estilos de vida, nefropatía diabética. (Fuente: Decs – BIREME)

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## INTRODUCTION

In diabetic nephropathy and other chronic or advanced microvascular complications due to diabetes mellitus, the use of intensive hypoglycemic therapy has been questioned, considering that, at this level of disease, the incidence of adverse effects associated with hypoglycemic therapy increases. Intensive therapy (HbA1C < 7%) has demonstrated its long-term benefit in the incidence of microvascular damage due to diabetes mellitus according to a prospective study of more than 10 years (UKPDS)<sup>(1)</sup>. The Asociación Americana de Diabetes (ADA) in its 2020 guideline considers a HbA1C level < 7% as a therapeutic objective for the general population, despite the fact that normal values in physiology fluctuate from 4.5 to 5%.

Only in those patients without risk of hypoglycemia or adverse effects from therapy, the guidelines recommend an HbA1C level < 6.5%. Patients with chronic kidney disease are comorbid and at risk of hypoglycemia, therefore, although diabetes is the leading cause of dialysis in the world, the therapeutic target in diabetic nephropathy according to the ADA is only HbA1C < 7%. Even if there is advanced microvascular damage the guideline sets a less stringent target of HbA1C < 8%<sup>(2)</sup>. Therefore, if evidence-based management focused on HbA1C is decided, it is not possible to guarantee normoglycemia. Evidence-based medicine, as it should be, should be patient-centered, with the therapeutic objective being metabolic control in its totality, its core being nutritional intervention and, in addition to this, all aspects of lifestyles. The present case represents a patient with chronic manifestations of diabetes mellitus in whom it is possible to evaluate the effect of intervention with lifestyle medicine.

## CLINICAL CASE

A 33-year-old male patient with a history of type 2 diabetes mellitus 12 years ago with late complications. History of retinopathy with retinal detachment. He

receives treatment with insulin therapy 35 U/d, metformin, atorvastatin. He was referred to nephrology for foamy urine. On examination, normotensive, BMI 32, trophic changes in lower limbs associated with signs of peripheral arterial insufficiency and no edema.

His occupation was cable installation technician, during his working day he ate outside the home, and at home, he ate what they had cooked for the whole family. He had no dietary restrictions of any kind and his diet included fast-absorbing carbohydrates such as refined flours like bread at breakfast, soft drinks and polymers in his meals such as rice, potato. He also had no restriction for type of vegetables or fruits. The patient had regular control by endocrinology and the insulin therapy and metformin regimen was without variation based on the HbA1C controls.

He had also had a nutritional consultation. At the first nephrology visit, the patient was informed of the degree of chronic kidney disease, the risk of progression associated with his diabetes mellitus, the recommendations on potential nephrotoxic agents to avoid and the use of angiotensin 2 receptor antagonists was pharmacologically prescribed because of the diabetic nephropathy. But it was also decided to make an intervention based on lifestyles centered on nutrition. Physical activity was suggested, but the patient reported a poor adherent disposition. Considering the time schedule of the outpatient clinic of 15 minutes, it was decided to prioritize dietary recommendations. On the other hand, the patient did not have sleep problems, whose period was 7 hours, nor did he have mood problems. Table 1 shows the follow-up analyses for the duration of the nutritional intervention in six months, considering that the deferral of appointments in the health system fluctuates from 6 to 8 weeks. There was adequate adherence during the intervention.

**Table 1.** Follow-up analysis during the intervention with MEV (Lifestyle Medicine).

	Visit 1	Visit 2	Visit 3	Visit 4
Proteinuria (mg/24 hours)	2341	1813	1600	495
Creatinine (mg/dl)	1.39	1.33	1.44	1.38
HbA1c (%)	7.1	-	-	6.8
Triglycerides (mg/dl)	201	-	-	118
Cholesterol LDL (mg/dl)	105	-	-	88





The intervention consisted of transmitting to the patient at the first visit, medical information about the effect of postprandial glucose elevations that are not necessarily assessed in fasting glycemia, the type of carbohydrate, the effect of renal toxicity that poorly controlled glycemia has on the inexorable progression of chronic kidney disease requiring dialysis if a lifestyle intervention is not performed, that an HbA1c value above the normal range (4.5-5%) is associated with poorly controlled glycemia and equally, chronic microvascular damage and that pharmacological intervention to reduce to a HbA1c level below 7% is associated with hypoglycemia as an adverse effect to the insulin regimen or hypoglycemic therapy. This information is transmitted in an empathic way, in terms understandable to the patient and integrates a "preaching of what is done", in that a dietary discourse should be consistent with a medical practice of not consuming sodas, fried foods, junk food (due to the excess of salt, sugar, oxidation products) and reinforce the benefit of consuming vegetables and fruits (due to fiber, trace elements, minerals and vitamins).

The intention is motivational because of the clear conviction of the reversible capacity of lifestyle change. In the second visit, the changes made by the patient were positively reinforced and he does not consume simple absorption carbohydrates. We explore what may limit the patient's dietary adherence. The patient's direction is encouraged, which implies recognizing the need for culinary knowledge and the projection that food has in the family and social aspect. The patient modulated his lunch, began to take his food with him on occasion and to modify the dietary pattern for dinner.

In the third visit the positive reinforcement continued. At this time we explored what anchors his behavioral patterns of eating habits that limit adherence. Knowledge and preparation of what is eaten continues to be promoted and information for this purpose continues to be provided. The distribution of macronutrients reduced carbohydrates, increased the fat component and maintained protein in proportion. Although the consumption of animal proteins was not promoted due to diabetic nephropathy, the whole intervention was focused on modulating carbohydrates with greater consumption of raw vegetables.

At the last visit, the control analyses are reviewed, which show improvement in terms of glycemic, lipemic and renal damage control due to reduction of proteinuria. Although the improvement of the analyses contributes to the patient's motivation, maintaining adherence faces a possible relapse of the behavioral habit or relapse of the type of diet that "integrates" him in his family and social aspect. Therefore, the intervention must be continuous, requiring an integrated team in lifestyle medicine. During the intervention the patient did not reduce the level of insulin therapy, however, he did not report episodes of hypoglycemia. Subsequently, the patient discontinued follow-up due to work problems.

## DISCUSSION

Lifestyle intervention has shown that it is possible to induce changes in the patient's metabolic control reflected in a reduction of hypoglycemic medication. In 2007, the randomized study AHEAD (Action for Health in Diabetes)<sup>(3)</sup>, included 5145 patients with type 2 diabetes and performed a dietary intervention (with caloric restriction, 30% fat, up to 10% saturated, 15% protein), physical activity based on METS (metabolic equivalent of at least 4) and group sessions with behavioral psychologists. Follow-up was 1 year and the percentage reduction in hypoglycemic use was 7.8% compared to the control group. However, the design of this study did not consider an implemented protocol for hypoglycemic medication reduction. In 2010, the randomized IDES study (The Italian Diabetes and Exercise Study)<sup>(4)</sup> enrolled 606 patients with type 2 diabetes mellitus and, in addition to caloric restriction, performed a supervised aerobic and resistance exercise intervention with a time according to the recommendation of the American College of Sports Medicine<sup>(5)</sup> of 150 minutes per week, achieving a discontinuation of insulin therapy in 13.5% of patients as opposed to 0% of the control group with standard treatment. Other studies have reported a reduction in the use of hypoglycemic medication in up to 73.5% of the lifestyle intervention group<sup>(6)</sup>. Most of these studies, although randomized, have not been designed with blinded participants (given the nature of the intervention), so the report of the diet is referred by the patient, the follow-up is only 12 months and in the exclusion criteria, they consider patients with late complications of diabetes such as retinopathy, macroalbuminuria and advanced chronic kidney disease.





In 2009, Buse, et al<sup>(7)</sup>, published the criteria for partial and complete remission of diabetes. Partial remission, if HbA1C is <6.5% and fasting glycemia between 100 and 125 mg/dl; complete remission, if HbA1C is <6% and fasting glycemia <100 mg/dl, both without use of hypoglycemic medication. This criterion was considered in the design of the DIRECT study<sup>(8,9)</sup>, whose lifestyle intervention for weight reduction had diabetes remission as its primary objective.

This study showed a 36% remission of diabetes mellitus after two years of follow-up, being up to 70% in the group that had maintained a weight loss of more than 15 kg. The design of this study contemplated a first phase of dietary replacement in the first 12 weeks with a liquid formula with a caloric restriction of 850 Kcal/d, a second phase of 6 weeks of dietary reintroduction, and finally a weight loss maintenance phase (50% carbohydrate, 35% fat and 15% protein regimen). Complementary information was provided to promote physical activity, face-to-face or telephone follow-up with the nutritionist or nursing staff, and different protocols were developed for the reduction or reintroduction of hypoglycemic or antihypertensive medication.

The impact of lifestyle intervention in diabetes has been demonstrated and in our clinical case we report the response in a patient with stage 3 chronic kidney disease (GFR 56 by MDRD4-IDMS), however, the lack of integration of a multidisciplinary team and the limitations of the health system itself, ultimately intervene in the lack of adherence of a patient. In the DIRECT study, the importance of these aspects to achieve the maintenance of the clinical objective is denoted, since those patients who maintained remission of diabetes at 12 and 24 months had an average weight loss of 10.4 kg, while those who had remission at 12 months but relapsed at 24 months had a weight loss of 3.7 kg.

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In patients with stage 3 chronic kidney disease, other intervention protocols have been designed to offer a dietary replacement, but based on the patient's daily diet, excluding sugars and starches. It also requires a multidisciplinary team and behavioral interventions<sup>(10)</sup>. In 2020, the ADA has considered diets such as Mediterranean, low or very low carbohydrate, vegetarian and plant-based diets as healthy eating patterns in diabetes<sup>(2)</sup>. Likewise, a complete lifestyle intervention requires management of other areas such as sleep quality, stress management, smoking cessation and social interaction<sup>(11)</sup>.

For an adequate intervention, the practice of lifestyle medicine has structured competencies according to the American College of Preventive Medicine. These competencies are: leadership, promoting and practicing lifestyle behavior; knowledge, in terms of benefits and intervention; skills, either social, for adaptation to change and focused on the patient's clinical history; therapeutic management, according to clinical guidelines, with shared medical decision and in collaboration with the family environment and, finally, community outreach, by establishing social groups, use of technology and measurement of processes applied to lifestyles<sup>(12)</sup>. These competencies require training, since it has been reported that only 49% of family physicians feel competent in prescribing a weight reduction program for obese patients<sup>(13)</sup>. The challenge will be even greater for patients with chronic complications, but as we have presented, it is never too late to do so.

## CONCLUSIONS

In the present case, lifestyle medicine has a fundamental role in the causal factor of the progression of diabetic nephropathy, which is to achieve optimal metabolic control. Achieving this goal requires a multidisciplinary approach and incorporates lifestyle aspects such as dietary, physical exercise, behavioral and hypoglycemic medication reduction protocols.

**Conflicts of Interest:** None

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