

Case Report

The Role of Diet Therapy in Reducing the Cardiovascular Disease Risk in a Patient with a Long-Standing and Recurring History of Obesity

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Abstract

Insulin resistance, often referred to as impaired insulin sensitivity. This clinical case focusses on a woman with insulin resistance and a long-standing and recurring history of obesity to demonstrate how diet therapy can be applied in addition to standard medication therapy.

Introduction

Insulin resistance, often referred to as impaired insulin sensitivity, is a condition in which cells in the liver, muscles, and adipose tissue are unable to react to the pancreatic hormone insulin, which is primarily responsible for controlling blood glucose levels [1]. The pancreas produces more insulin in response to rising blood sugar levels, resulting in hyperinsulinemia [2]. Elevated insulin levels can also lead to weight gain, which worsens insulin resistance [3]. The lack of a standard test to identify the insulin resistance and the fact that no symptoms appear until the pancreas produces enough insulin to overcome the resistance make the condition difficult to diagnose [4]. Insulin resistance, however, can eventually result in prediabetes and type 2 diabetes [5].

This clinical case focusses on a woman with insulin resistance and a long-standing and recurring history of obesity to demonstrate how diet therapy can be applied in addition to standard medication therapy.

Case history

A 48-year-old woman, 164 cm tall, has been through menopause for a year, with obesity of the first degree, insulin resistance, and a long history of restrictive diets with a yo-yo effect. Since childhood, she has had specific constitutional features of the body structure— a very slim upper body and gynoid fat accumulation around the hips and thighs. Her weight was about 60 kg – 65 kg when she was 14 years – 15 years old. Through rigorous dieting, she was able to reduce

her weight to 50 kg by the time she was 18 years old. She was able to keep her weight at 50 kg till she gained about 10 kg during her first pregnancy. Her weight ranged from 50 to 60 kg before her second pregnancy. She gained 36 kg in total throughout the second pregnancy. She persisted in her strict diet regimen. She found it more and more difficult to get rid of the extra weight. She had a liver surgical procedure in 2012 because of an adenoma, and after that, her weight increased once again (30 kg in 6 months). It was discovered in 2013 that she had insulin resistance following thorough testing. The patient began taking Metfogamma (3 g/day). Initially, she lost roughly 20 kg, experienced fewer symptoms (headache, irregular period), and felt healthier. In 2020 (after about 7 years of using metformin preparation and keeping a constant weight of approximately 70 kg), she started to feel fatigued, suffer stomach problems, and experience discomfort without altering anything in her diet, physical activity, or medication. The patient arbitrarily stopped taking Metfogamma and gradually started to gain weight again, going from 70 kg to 94 kg. As of September 2023, when she sought medical help, she was eating once a day (at lunch), and the rest of the time she was taking coffee, water, and fruit.

Discussion

Insulin resistance is frequently associated with type 2 diabetes, obesity [6], cardiovascular disease, non-alcoholic fatty liver disease [7], metabolic syndrome [8], and polycystic ovary syndrome (PCOS) [9].

More Information

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Submitted: October 04, 2024

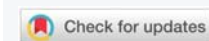
Approved: October 10, 2024

Published: October 11, 2024

How to cite this article: Rangelova L, Nikolova M. The Role of Diet Therapy in Reducing the Cardiovascular Disease Risk in a Patient with a Long-Standing and Recurring History of Obesity. J Community Med Health Solut. 2024; 5(2): 069-071. Available from: <https://dx.doi.org/10.29328/journal.jcmhs.1001050>

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Keywords: Insulin resistance; Obesity; Diet therapy



**Table 1:** Changes in body composition and key indicators for cardio-metabolic risk control.

Date/Body composition index	Body weight, kg	Fat mass, kg	% fat mass	FFM, kg	SMM, kg	Fat mass, trunk, kg	BMI kg/m ²
September, 2023	90.7	40.9	45.1	49.8	27.6	18.8	33.7
October, 2023	89.6	41.1	45.9	48.5	26.8	19.2	33.3
February, 2024	79.9	34.0	42.5	45.9	25.3	17.2	29.7
September, 2024	75.8	26.9	35.5	48.9	26.9	14.1	28.2
Difference related to 12 months	-14.9	14.0	-9.6	-0.9	-0.7	-4.7	-5.5

Table 2: Basic biochemical indicators.

Years/Indicators	BS 0' min	BS 60' min	BS 120' min	IRI 0' min	IRI 60' min	IRI 120' min	TSH	HbA1C%	HOMA-IR < 2.5
2013	5.95	8.65	4.8		68.89		1.160	5.2	
2016	6.57	9.37	7.94	10.27	65.91	80.46	1.83		2.99
2023 - June	5.42	6.45	2.35	7.25	123.6	8.12	0.63		1.74
2024 - September	5.66	5.15	3.94	7.65	165.6	8.07		5.23	1.97

It seems that lack of physical exercise and extra body fat, particularly around the abdomen, are the two primary variables that lead to insulin resistance. Lifestyle modifications are the primary therapy for insulin resistance because certain variables, such as age and genetics, cannot be addressed. Diet, exercise, and weight loss are examples of changes in lifestyle [10].

The patient's therapy includes a combination of diet and drug treatment. On 6th September 2023, the patient was prescribed a low-carbohydrate diet and glucophage 2 g per day. Body composition was measured through body impedance Inbody 230 (weight: 90.7 kg; % BF: 45.1%; BMI: 33.8 kg/m²) (Table 1). On 25th October 2023, a second measurement of body composition was made with body impedance Inbody 230 (weight: 89.6 kg; % BF: 45.9%; BMI: 33.4 kg/m²). With a slight decrease in weight, the percentage of body fat increased. After discussion, saxenda was added to the treatment at a maximum dose of 3 mg/day. The patient was prescribed a significantly more restrictive diet by maintaining a three-low-carbohydrate meal plan while excluding all sugar and confectionery products, soft drinks containing sugar, and alcohol. The consumption of bread, potatoes, rice, and sweet fruits is significantly reduced. Dinners are provided till eight o'clock p.m. and mostly consist of vegetables. Fish is offered once a week and meat three times. A 2-litre daily fluid consumption is recommended. Body composition was measured once more on 22nd February 2024, or four months after beginning a stringent dietary and medical plan (weight: 79.9 kg; % BF: 42.5%; BMI: 29.8 kg/m²). The percentage of body fat decreased significantly in the absence of physical activity, and an 11 kg weight loss was achieved. According to the most recent measurements taken on September 29, 2024, there has been a decrease in body weight and an alteration in body composition. Within a year, there was a reduction of nearly 15 kg in body weight; 14 kg can be attributed to fat mass, and the remaining 4.7 kg to visceral fat. The BMI decreased by 5.5 kg/m², although the FFM and SMM decreased very little. There was an almost 10% reduction in total body fat. The patient's body composition markers, indicating sarcopenic obesity and detected a year ago, have improved as a result of all these modifications.

Data on induced hyperinsulinemia, intermediate hyperglycemia at the 60 minute, and impaired glucose tolerance were obtained from oral glucose tolerance tests (OGTT) conducted between 2013 and 2016. The blood sugar curve remains flat and induced hyperinsulinemia is still present, according to the most recent biochemical indicators from September 2024 (Table 2). Treatment is continued with metformin preparation, GLP-1 agonist, vitamin B12, and magnesium. Adenuric was introduced at a dose of 80 mg per day due to elevated uric acid levels.

The patient is recommended to follow the guidelines of restricting eating TRE (10/14 hours) and optimise her diet, as well as to increase moderate physical activity to 300 minutes per week. A patient's desire to modify her lifestyle grows as she loses weight.

Patients with insulin resistance need to follow a diet that achieves and maintains optimal metabolic outcomes. Blood glucose levels should be normal or close to normal. Avoiding complications, such as diabetes, is crucial. Sustaining an optimal lipid profile is essential for preserving vascular health. It is necessary to keep blood sugar levels within the normal range to minimise the risk of cardiovascular events. As the patient is going through menopause, which further promotes hyperinsulinemia and insulin resistance, insulin management is required. Generally speaking, however, managing the pre-diabetic condition additionally controls the cardio-metabolic risk [11,12].

Conclusion

In the context of enhancing overall nutritional status, the case study of a patient with obesity and insulin resistance demonstrates the role that the diet plays in restoring several fundamental biochemical indicators to normal levels.

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