

# Impact of Traditional Moroccan Diets on Cardiovascular Health: Study at CHU Casablanca

A. Altimimi., M. Amri \*, S. Ejebli, A. Ennasery, R. Habbal

Cardiology, CHU Ibn Rochd, Casablanca.

**\*Corresponding Author:** Meriam Amri, Cardiology, CHU Ibn Rochd, Casablanca.

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## Abstract

### Introduction

Cardiovascular diseases (CVDs) are a leading cause of mortality in Morocco. The traditional Moroccan diet is rich in beneficial foods such as vegetables, fruits, legumes, and olive oil, but it also includes a high intake of salt, which can negatively impact cardiovascular health. This study aims to evaluate the impact of the traditional Moroccan diet on cardiovascular health in patients consulting at CHU Casablanca.

### Methods

This cross-sectional study involved 200 adult patients from the cardiology department at CHU Casablanca. Dietary habits were assessed using a questionnaire adapted to the Moroccan context. Clinical data, including blood pressure, cholesterol levels, fasting blood glucose, and body mass index (BMI), were collected. Cardiovascular risk factors were analyzed based on adherence to the traditional Moroccan diet, and regression models were used to adjust for confounding variables.

### Results

Of the 200 patients, 56% adhered to the traditional Moroccan diet. These patients had higher blood pressure, LDL cholesterol, fasting glucose, and BMI compared to those following other diets. The mean systolic blood pressure in the traditional diet group was 140 mmHg compared to 135 mmHg in the other group. The prevalence of CVDs was slightly higher among the traditional diet group (22% vs. 18%). Regression analysis showed a moderate association between the traditional diet and an increased risk of CVDs (OR: 1.20, 95% CI: 1.05-1.40).

### Discussion

The findings indicate that the traditional Moroccan diet, despite its beneficial components, is associated with an increased risk of CVDs, primarily due to its high salt content. The excessive salt intake may contribute to elevated blood pressure and increased cardiovascular risk.

### Conclusion

This study highlights the need to raise awareness about reducing salt intake while preserving the beneficial elements of the traditional Moroccan diet to improve cardiovascular health.

**Keywords:** CVDs; diet; Blood Pressure; lipid profile

## 1. Introduction

Cardiovascular diseases (CVDs) are one of the leading causes of mortality in Morocco, as highlighted by the World Health Organization in 2014 [1]. The Moroccan population follows a traditional diet that is known for being rich in various beneficial foods such as vegetables, fruits, legumes, and olive oil. However, this diet is also characterized by a high intake of salt, which can negatively impact cardiovascular health [2]. Given the significant role that diet plays in the prevention and management of CVDs, it is essential to better understand the effects of these dietary patterns on the cardiovascular health of the Moroccan population. This study aims to assess the impact of the traditional Moroccan diet on cardiovascular health, focusing specifically on patients consulting at the CHU Casablanca. By examining the dietary

habits of these patients, this research seeks to identify potential correlations between food consumption and cardiovascular outcomes, contributing to a deeper understanding of how traditional diets influence health in the Moroccan context.

## 2. Materials and Methods

### 2.1. Study Design

This cross-sectional study was conducted among 500 adult patients consulting the cardiology department at CHU Casablanca. The patients

included in the study represent diverse socio-economic and demographic profiles to ensure representativeness of the population served by the CHU.

## 2.2. Data Collection

- Dietary Questionnaires: Patients' dietary habits were assessed using a validated questionnaire adapted to the Moroccan context.
- Clinical Data: Measurements of blood pressure, cholesterol levels, fasting blood glucose, and body mass index (BMI) were collected.
- Medical History: Patients' medical histories, including cardiovascular diseases, were collected.

## 2.3. Data Analysis

Participants were classified according to their adherence to a traditional Moroccan diet. Cardiovascular risk factors were compared between groups, and regression models were used to assess the association between the diet and CVDs after adjusting for confounding variables.

## 3. Results

The study included 200 patients consulting at CHU Casablanca, focusing on their adherence to the traditional Moroccan diet and its potential impact on cardiovascular health. This diet, rich in vegetables, fruits, legumes, whole grains, and olive oil, also contains a significant amount of salt. Among the participants, 112 patients (56%) adhered to this traditional dietary pattern, while the remaining 88 patients followed other dietary habits.

### 3.1. Cardiovascular Risk Factors

The analysis of cardiovascular risk factors revealed several important differences between patients adhering to the traditional Moroccan diet and those with different dietary patterns.

- Blood Pressure: Patients adhering to the traditional Moroccan diet exhibited higher blood pressure readings compared to those following other diets. Among the 112 patients following the traditional diet, the mean systolic blood pressure was 140 mmHg, and the mean diastolic pressure was 88 mmHg. In contrast, the 88 patients following other dietary habits had lower mean blood pressure values, with a systolic average of 135 mmHg and a diastolic average of 85 mmHg. The higher blood pressure in the traditional diet group is likely linked to the high salt intake.

- Cholesterol Levels: Patients adhering to the traditional Moroccan diet had moderately elevated LDL ("bad") cholesterol levels, with an average of 2.8 mmol/L, compared to 2.5 mmol/L in those following other diets. HDL ("good") cholesterol levels were slightly lower in the traditional diet group, averaging 1.0 mmol/L compared to 1.1 mmol/L in the non-traditional diet group.

- Blood Glucose: Fasting blood glucose levels were marginally higher in the traditional diet group, averaging 6.2 mmol/L, compared to 5.8 mmol/L in the non-traditional diet group. This indicates a slightly increased risk of hyperglycemia and potential development of type 2 diabetes in the traditional diet group.

- BMI (Body Mass Index): The average BMI of patients adhering to the traditional Moroccan diet was 29 kg/m<sup>2</sup>, compared to an average BMI of 27 kg/m<sup>2</sup> among patients following other diets. This suggests a higher prevalence of overweight and obesity in the traditional diet group, which are known risk factors for cardiovascular diseases.

### 3.2. Prevalence of Cardiovascular Diseases

The prevalence of cardiovascular diseases (CVDs) was slightly higher among patients following the traditional Moroccan diet, with 22% of these patients diagnosed with CVDs compared to 18% in patients following different dietary habits.

Further statistical analysis using regression models indicated that adherence to the traditional Moroccan diet was associated with a moderately increased risk of cardiovascular diseases. After adjusting for age, sex, physical activity, and other confounding variables, the odds ratio (OR) for developing CVDs in the traditional diet group was 1.20 (95% CI: 1.05-1.40). This suggests that while the traditional Moroccan diet has several beneficial components, its high salt content and associated risk factors such as elevated blood pressure and BMI contribute to a moderately increased risk of cardiovascular disease in this population.

## 4. Discussion

This study raises critical questions about the pathophysiology of cardiovascular diseases (CVD) associated with adherence to the traditional Moroccan diet. While this diet is rich in beneficial nutrients such as fiber, antioxidants, and unsaturated fatty acids, it has a significant drawback: high salt consumption [3]. From a pathophysiological perspective, excess sodium leads to water retention in the body, increasing blood volume and consequently raising blood pressure. This sodium overload disrupts the regulatory systems of blood pressure, particularly the renin-angiotensin-aldosterone system (RAAS), which plays a key role in fluid balance and vasoconstriction [3,4]. Chronic RAAS stimulation, induced by excessive salt intake, can lead to cardiac hypertrophy and vascular remodeling, contributing to the development of hypertension and CVD [5].

Additionally, chronic inflammation and oxidative stress are other pathophysiological mechanisms associated with high-salt diets. Salt induces endothelial dysfunction, characterized by reduced nitric oxide (NO) production, a key vasodilator, which increases arterial stiffness and vascular resistance [6]. This endothelial dysfunction directly contributes to elevated blood pressure and the development of atherosclerosis, a primary cause of many cardiovascular diseases [7].

The relationship between diet and lipid profile is also relevant from a pathophysiological standpoint. While olive oil, rich in monounsaturated fatty acids, has beneficial effects in reducing LDL oxidation, the intake of saturated fats and excessive salt in the traditional Moroccan diet may impair lipid metabolism, leading to the accumulation of oxidized LDL cholesterol in arterial walls [8]. This process is central to the development of atherosclerosis, characterized by the deposition of lipids in the arterial walls, narrowing the vessels and increasing the risk of coronary artery disease. Atherosclerosis in the coronary arteries reduces blood flow to the heart, increasing the risk of myocardial infarction [8,9].

Regarding strokes, chronic hypertension, exacerbated by high sodium intake, is a major risk factor [10]. Hypertension damages the blood vessel walls, increasing the likelihood of rupture or blockage in cerebral arteries, which can lead to ischemic or hemorrhagic strokes [9]. Our findings, showing higher blood pressure in the group following the traditional Moroccan diet, support these pathological mechanisms and highlight the importance of reducing salt intake to prevent both coronary artery disease and strokes.

The increased risk of type 2 diabetes observed in patients following the traditional Moroccan diet (fasting glucose level of 6.2 mmol/L) may further exacerbate the effects of other cardiovascular risk factors. Chronic hyperglycemia induces glycation of proteins and lipids, leading to the formation of advanced glycation end-products (AGEs), which promote inflammation and vascular stiffness [11]. The combination of these

mechanisms creates a vicious cycle of endothelial dysfunction, oxidative stress, and systemic inflammation, accelerating the progression of cardiovascular diseases.

Finally, this study makes a significant contribution by providing specific data on the Moroccan population, thus enhancing the understanding of the effects of the traditional Moroccan diet on cardiovascular health. Our findings align with several international studies on Mediterranean diets and their variations. While these diets are widely recognized for their cardiovascular benefits due to the presence of unsaturated fatty acids and antioxidants, many studies have also highlighted the negative impact of excessive salt intake, particularly in relation to hypertension [12]. Our results, showing higher blood pressure and an increased incidence of cardiovascular diseases in patients following this diet, confirm these findings, illustrating that elevated salt consumption is strongly correlated with increased risk of hypertension and CVD [13]. This study underscores the importance of reducing sodium intake while retaining the beneficial elements of the diet, a recommendation that echoes dietary interventions in other regions, where promising results have been seen in reducing the risks of coronary artery disease and stroke.

## Conclusion

This study highlights the continued need to raise awareness among CHU Casablanca patients about the dangers of excessive salt consumption, despite the national efforts already in place, such as public health strategies and awareness campaigns. Although initiatives exist to promote healthy eating habits and train general practitioners on the importance of nutrition in preventing cardiovascular diseases, it is crucial to strengthen and expand these actions. The focus should be on reducing salt intake while maintaining beneficial foods such as vegetables, fruits, and legumes. Increased support for healthcare professionals in disseminating these messages and regular evaluation of the impact of these strategies on the population could maximize the benefits for cardiovascular health and reduce the incidence of diet-related diseases.

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