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Dietary Patterns and Cancer Incidence in European and Mediterranean Countries: A Comparative Analysis

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1. Abstract

1.1. Aims: The objective of this study was to examine the relationship between dietary patterns, geographic latitude, and economic status with cancer incidence in European and Mediterranean countries.

1.2. Methods: This observational study analyzed country-level data on food consumption patterns, cancer incidence, and socioeconomic indicators. Dietary structures were evaluated using average food consumption levels (grams per person per day) and categorized into four main groups: animal-based products, grains and vegetables, fruits and beverages, and alcoholic drinks.

1.3. Results: Compared with Mediterranean countries, European countries showed a higher incidence of several cancer types, which appeared to be associated with both per capita income and geographical latitude. In European countries, five cancer types were significantly influenced by per capita income alone, while another five were primarily associated with latitude. Seven cancer types showed no association with either factor. The dietary patterns of both regions were strongly related to economic conditions. As income increased in European countries, the proportion of animal products and alcoholic beverages in the diet also increased ($p = 0.004$). Furthermore, the intake of animal-derived macronutrients in European countries was approximately 1.5–3 times greater than in Mediterranean countries and correlated significantly with income levels ($p = 0.001$).

1.4. Conclusion: Economic development strongly influences dietary composition in both European and Mediterranean countries. Higher consumption of animal products and alcohol, which is more common in higher-income regions, may contribute to increased cancer risk. The source and composition of dietary macronutrients play a crucial role in shaping dietary patterns associated with cancer incidence.

2. Keywords: Dietary patterns, cancer incidence, Europe, Mediterranean diet, nutrition epidemiology

3. Introduction

Chronic noncommunicable diseases (NCDs) represent one of the most serious global health challenges. Each year, approximately 15 million people between the ages of 30 and 69 die from NCDs, with cancer accounting for nearly 8.8 million deaths worldwide. In many developed countries, cancer has become a leading cause of morbidity and mortality.

Previous research has shown that populations in Mediterranean regions tend to have lower rates of certain diseases, including breast cancer and Alzheimer's disease. These health benefits have frequently been attributed to the Mediterranean diet, which typically contains lower levels of animal protein and higher proportions of unsaturated fatty acids.

Nutritional patterns during early life may also influence susceptibility to chronic diseases later in life. Diets high in calories and saturated fats have been identified as potential risk factors for several types of cancer. However, the specific role of different macronutrient sources—such as fats, carbohydrates, and proteins—in cancer development remains unclear.

Some studies suggest that Western dietary patterns, which emphasize animal products and processed foods, may increase the risk of diseases such as breast cancer. At the same time, food consumption habits are influenced by complex behavioral and environmental factors. Because diet is a modifiable factor, understanding its role in disease risk is essential for developing preventive strategies.

Although observational studies are sometimes criticized for their limitations, they remain valuable for examining large datasets and identifying population-level patterns in nutrition and health outcomes. Therefore, the primary objective of this study was to compare cancer incidence in European and Mediterranean countries and evaluate how economic conditions and geographic latitude influence dietary patterns and disease risk.

4. Materials and Methods

4.1. Study Design

This investigation was conducted as an observational cross-

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country study.

4.2. Data Sources

Cancer incidence data were obtained from the GLOBOCAN database and standardized by age per 100,000 population. Additional health and socioeconomic indicators, including life expectancy, were retrieved from international statistical databases.

Information on food consumption was obtained from the Food and Agriculture Organization (FAO). Dietary data were expressed both as total consumption (grams per person per day) and as percentage contributions from four major food groups:

1. Animal products
2. Cereals and vegetables
3. Fruits and non-alcoholic beverages
4. Alcoholic beverages

4.3. Socioeconomic Indicators

To evaluate national development levels, several indicators were included:

- Gross Domestic Product (GDP) per capita
- Human Development Index (HDI)
- Healthcare performance indicators
- Environmental performance indices
- National happiness index

Geographical location was determined based on the latitude of each country.

4.4. Statistical Analysis

Statistical comparisons between country groups were performed using the nonparametric Mann–Whitney–Wilcoxon test for independent samples, as many variables were not normally distributed.

Data distributions were summarized using medians and interquartile ranges (IQR). All analyses were performed using statistical software.

5. Results

5.1. Differences Between European and Mediterranean Countries

Sixteen European countries were compared with sixteen Mediterranean countries. On average, per capita income in European countries was approximately twice that of Mediterranean countries. European countries were generally located at higher latitudes, whereas Mediterranean countries were situated closer to the equator. Despite differences in economic and geographic conditions, overall disease prevalence and life expectancy were relatively similar between the two regions. However, indices related to healthcare quality, environmental efficiency, and general wellbeing were higher in European countries.

5.2. Cancer Incidence Patterns

The analysis revealed that the incidence of several cancer types—including brain, breast, colorectal, kidney, melanoma, pancreatic, prostate, and testicular cancers—was significantly higher in European countries.

Conversely, certain cancers such as nasopharyngeal cancer were more prevalent in Mediterranean regions. Other cancers, including liver, lung, stomach, and thyroid cancer, showed no statistically significant differences between the two groups.

5.3. Metabolic Risk Factors

A large proportion of the population in both regions had body mass index (BMI) values above 25 kg/m². However, elevated blood cholesterol levels and hypertension were more common in European populations.

Low physical activity was also common in both regions, affecting approximately half of the population.

5.4. Dietary Structure

Clear differences were observed in dietary patterns between European and Mediterranean countries.

European diets contained:

- Higher proportions of animal-based foods
- Greater alcohol consumption
- Lower intake of grains and vegetables Mediterranean diets contained:
- Higher proportions of cereals, vegetables, and plant-based foods
- Lower levels of animal products and alcohol

Interestingly, total daily caloric intake did not differ significantly between the two groups. However, the sources of calories differed substantially.

European diets contained significantly higher levels of animal-derived macronutrients such as fats and proteins.

6. Discussion

This study evaluated how economic conditions and geographic location influence dietary habits and cancer incidence.

One notable finding was that although European countries generally had higher living standards and longer life expectancy, they also showed higher rates of several cancer types. This pattern may be partly explained by differences in dietary structure.

Higher income levels were associated with increased consumption of animal products and alcoholic beverages, which are known risk factors for certain cancers. At the same time, plant-based foods such as grains and vegetables were consumed less frequently in these regions.

The analysis also suggested that some cancer types may be influenced by latitude-related environmental factors. For example, cancers of the gastrointestinal tract showed stronger associations

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with geographic location.

In contrast, other cancers appeared unrelated to income or latitude and may be influenced by other factors such as viral infections or genetic susceptibility.

Overall, the findings support the widely accepted view that diets emphasizing plant-based foods, healthy fats, and reduced intake of red meat and alcohol may help reduce cancer risk.

7. Conclusion

This study highlights several key findings:

1. Certain cancers in European countries are influenced by both economic conditions and geographic latitude.
2. Dietary structure and macronutrient composition are strongly associated with national income levels.
3. Diets containing high proportions of animal products and alcohol may increase the risk of several cancer types.

These results emphasize the importance of promoting balanced dietary patterns—similar to the Mediterranean diet—to reduce cancer risk and improve public health outcomes.

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