

Chapter 3

Overview of Autoimmune Diseases and the Role of Diet

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ABSTRACT

Autoimmune diseases, posing significant public health challenges globally, involve immune system dysfunction targeting the body's own tissues. This chapter offers a detailed exploration, categorizing them into organ-specific and systemic disorders and analysing mechanisms driving their development. Factors like genetic predisposition, gender, environmental triggers, and geographical influences are investigated for their roles in disease onset and progression. Additionally, the chapter delves into the emerging understanding of diet's impact on autoimmune diseases, from industrial additives affecting gut permeability to dietary patterns altering gut microbiota composition. Moreover, the therapeutic potential of dietary interventions like the Mediterranean diet and gluten-free diets in managing autoimmune diseases is examined. By addressing types of autoimmune diseases, their influencing factors, and the evolving role of diet, this chapter aims to offer valuable insights for clinicians, researchers, and policymakers striving to enhance prevention, diagnosis, and management strategies.

INTRODUCTION

The immune system serves as the body's primary defence mechanism, diligently protecting against a myriad of threats including pathogens, foreign invaders, and aberrant cells. Through its intricately woven network of cells, tissues, and mole-

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cules, it orchestrates a meticulously regulated response to uphold health and combat diseases, ensuring the body's survival. This complex system comprises an array of chemical, cellular, and protein-based defenses, each playing a crucial role in safeguarding the body's integrity while discerning between harmful invaders and the body's own tissues. As the immune system matures, it undergoes a developmental process wherein immune cells targeting the body's own tissues are systematically eliminated, thereby establishing a state of self-tolerance crucial for maintaining immune homeostasis. However, autoimmunity ensues when the intricate balance falters, and the immune cells fail to recognize self-antigens, leading to the inadvertent destruction of healthy cells and tissues. Historically, the immune system's response to self-antigens, commonly referred to as autoimmunity, was considered an aberration. It wasn't until the 20th century that German immunologist Paul Ehrlich in 2009 pioneered the study of autoimmunity, famously dubbing it "Horror autotoxicus," shedding light on this intricate facet of immunology and paving the way for further research into understanding and managing autoimmune diseases (Ehrlich P, 2009). In 1965, Macfarlane Burnett introduced the concept of autoimmunity alongside ground-breaking ideas concerning lymphoid cell maturation, thymic instruction, apoptosis, and the elimination of self-reactive cells within his hypothesis (Wang L et al., 2015). In recent years, researchers have come to understand that autoimmunity is a natural occurrence, as evidenced by the presence of self-reactive antibodies and autoimmune cells in the immune systems of all healthy individuals. While the precise etiology of the autoimmune disease remains uncertain, research indicates a multitude of factors at play, encompassing lifestyle choices, environmental influences, genetic predispositions, and hormonal fluctuations. It's noteworthy that individuals who have one autoimmune disease face an elevated likelihood of developing another, as their immune system grapples with differentiating between self and non-self-antigens. Individuals with autoimmune diseases commonly encounter symptoms like inflammation, fatigue, weight fluctuations, abdominal discomfort, and others, which tend to vary based on both the specific disease type and the individual's unique presentation. The clinical symptoms linked to each autoimmune disorder display a spectrum of variations, spanning from acute organ failure with life-threatening implications to enduring chronic conditions (Koppala SN, Guruprasad V, 2013).

Although autoimmune diseases are not as prevalent as some other medical conditions, their significance in terms of mortality and morbidity cannot be overstated. Factors such as gender, environmental influences, and geographical location appear to exert notable effects on the frequency and distribution of these diseases within populations. Understanding these multifaceted influences is crucial for developing effective strategies for prevention, diagnosis, and management (Wang L et al., 2015). Autoimmune diseases can manifest across a broad spectrum of ages, and the influence of gender biases, ethnicity, and demographics on their occurrence is

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