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ORIGINAL PAPERS

THE INFLUENCE OF PLANTS ON THE MICROBIOME IN PATIENTS WITH AUTOIMMUNE DISEASES

Gheorghe GIURGIU[1], Manole COJOCARU[2,3], Georgeta SINIȚCHI[4]

[1] Deniplant-Aide Sante Medical Center, Biomedicine, Bucharest, România
deniplant@gmail.com
https://orcid.org/0000-0002-5449-2712
[2] Titu Maiorescu University, Faculty of Medicine, Bucharest, România
[3] Academy of Romanian Scientists
cojocaru.manole@gmail.com
https://orcid.org/0000-0002-7192-7490
[4] Atopy Allergological Medical Center, Iași, România

Abstract. ***Background*** *It is now evident that the gut microbiota has a profound effect on the host immune system. The interactions between the gut microbiota and host immunity are complex, dynamic and context-dependent. The gut microbiota and its metabolites have been shown to influence immune homeostasis both locally and systemically. Bacterial contents such as lipopolysaccharide and bacterial antigens can induce a systemic inflammatory environment. The biggest question in the field is whether inflammation causes gut dysbiosis or dysbiosis leads to disease induction or propagation.*
Objectives *To demonstrate role of plants in the management of disfunctional immune responses. The direct modulation of gut microbiome that could diminish chronic inflammatory responses and ameliorate adaptive immune responses is major pathway to stabilize autoimmune diseases.*
Materials and methods *Recent reports indicate that dysbiosis is increased in autoimmune diseases. Plant modulation of the immune system can also have a role in the autoimmune disease, acting to reduce or delay the onset of immune-mediated diseases. Ongoing research in this field will ultimately lead to a better understanding of the role of diet and plants in chronic inflammation in patients with autoimmune diseases.*
Results *Plants may restore the composition of the gut microbiome and introduce beneficial functions to gut microbial communities, resulting in amelioration or prevention chronic inflammatory responses.*
Conclusion *The gut microbiota is considered to be a master regulator of immune homeostasis. Besides modifying the gut microbiota, plants modulate the immune system in patients with autoimmune diseases.*

Keywords: plants, autoimmune diseases, microbiome, immunomodulation

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Recently, many scientists have focused on the importance of the commensal bacteria in the pathogenesis of several diseases, including autoimmune diseases (1). Autoimmune diseases result from an individual's immune system attacking self-tissues, with an estimated incidence of approximately 3-5% worldwide (2). The pathogenesis is not understood completely, but environmental factors (life-style, diet, drugs, infections) and certain genetic backgrounds have been proposed. The human body is densely populated by commensal and symbiotic microbes, the majority of the constituent microorganisms being bacteria (3). These microbes occupy different habitats such as gut, skin, vagina and oral. The genome of these microorganisms and their ecosystems constitute a microbiome. Factors such as diet, environment, host genetics and mode of delivery may be the reason behind the wide microbial diversity (4).

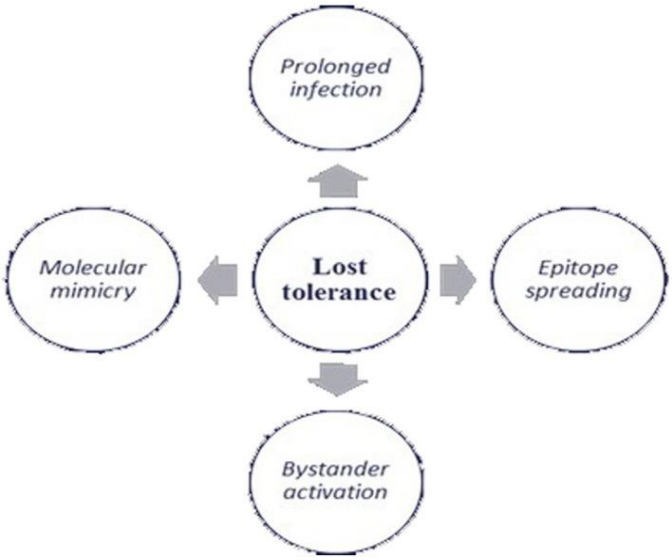

Fig. 1 The loss of tolerance (1)

Recently, alteration of microbiota has attracted the attention of many researchers (5-9).

It is now evident that the gut microbiota has a profound effect on the host immune system. The interactions between the gut microbiota and host immunity are complex, dynamic and context-dependent (10). The gut microbiota and its metabolites have been shown to influence immune homeostasis both locally and systemically. Bacterial contents such as lipopolysaccharide and bacterial antigens can induce a systemic inflammatory environment. The biggest question in the field is whether inflammation causes gut dysbiosis or dysbiosis leads to disease induction or propagation (11-15).

The presence of the microbiome and microbial products regulate the development and function of the immune system in the host. Recently, many scientists have focused on the importance of the commensal bacteria in the pathogenesis of several diseases, including autoimmune diseases (16).

In recent years, several studies have highlighted the role of the microbiome in the pathogenesis of autoimmune diseases (17, 18).

Alteration of microbiome 'dysbiosis' can induce autoimmune disease in people with certain genetic backgrounds and environmental factors. The presence of the microbiome and microbial products regulate the development and function of the immune system in the host. Dysbiosis can result from the exposure to various environmental factors, including diet, toxins, drugs and pathogens (19, 20).

The human microbiome might be a major player in autoimmunity, as the loss of immune tolerance can be caused by microbial composition changes. According to many researchers, dysbiosis also seems to be involved in the pathogenesis of type 1 diabetes mellitus.

There are many mechanisms by which plant foods improve autoimmune conditions. Several nutrients found in them have demonstrated a protective and anti-inflammatory effect for autoimmune disorders, including polyunsaturated fats and antioxidants. The direct modulation of gut microbiome that could diminish chronic inflammatory responses and ameliorate adaptive immune responses is major pathway to stabilize autoimmune diseases. Diet has the most significant influence on shaping gut microbial community (21, 22).

Communication between the central nervous system and gut is bidirectional, and is referred to as the 'gut microbiota-brain axis'. The gut can interact with the brain through several pathways and through commensal metabolism, such as short-chain fatty acid (SCAFs), 5-hydroxytryptamine (5-HT) and gamma-aminobutyric acid (GABA).

The authors suggested particularly that an alteration of the intestinal microbiome during the immune-priming phase could induce an inflammatory response in the joints. It is possible to restore the healthy microbiota through administration of nutrients.

The objective of this study was to demonstrate role of Imuniplant in the management of disfunctional immune responses. The direct modulation of gut microbiome that could diminish inflammatory responses and ameliorate adaptive immune responses is major pathway to stabilize autoimmune disease. Imuniplant modulation of the immune system has applications within the clinical setting, but can also have a role acting to reduce or delay the onset of immune-mediated chronic diseases.

The association between bacteria and autoimmune disease is well understood; alteration of microbiome 'dysbiosis' can induce autoimmune disease in people with certain genetic backgrounds and environmental factors. The pathogenesis of

SLE is not understood completely; it is thought to involve hormonal factors, environmental factors (infection, drugs, ultraviolet A light) and genetic causes.

Recent reports indicate that dysbiosis is increased in autoimmune diseases. Plant modulation of the immune system can also have a role in the autoimmune disease, acting to reduce or delay the onset of immune-mediated diseases. Ongoing research in this field will ultimately lead to a better understanding of the role of diet and plants in chronic inflammation in patients with autoimmune diseases (23-25)

Ample evidence suggests that plant-based diets are protective against autoimmune disease and have the potential to produce improvements in symptoms. Plant-derived antioxidants have an anti-inflammatory effect by controlling free radicals leading to oxidative stress and pro-inflammatory cytokines involved in the pathogenesis of autoimmune diseases. Imuniplant may restore the composition of the gut microbiome and introduce beneficial functions to gut microbial communities, resulting in amelioration or prevention of gut inflammation and other autoimmune diseases (26, 27).

Dysbiosis can disturb the host energy homeostasis and resulting imbalance can promote proinflammatory environment, leading to predisposition/progression of autoimmune diseases. Gut bacteria are separated from the host through a physical barrier such as skin or gut epithelial lining. However, gut dysbiosis can compromise gut barrier integrity, resulting in translocation of bacterial contents across the epithelial barrier (leaky gut) (28-31).

Fig. 2 Imuniplant tea is a natural immunomodulator of the human microbiome

Imuniplant tea for autoimmune and metabolic diseases, natural immunomodulator of the human microbiome. Imuniplant tea is a natural genetic immunomodulator of the human microbiome that contributes to the removal of microbiota dysbiosis and thus autoimmune and metabolic diseases can be prevented and removed. Imuniplant contains: cultivated medicinal plants 35%; plant from the spontaneous flora 25%; buds of fruit trees 15%; flowers of fruit trees 15%; berries 10%.

Fig. 3 Form of presentation

Form of presentation: dry and ground powder packed in tea bags of 1 gram each. 30 envelopes/pack.

Properties: natural genetic immunomodulator, it regulates cellular metabolism, it regulates the central nervous system, it modulates the activity of important neurotransmitters, physically and mentally energizing, remineralizing, it increases resistance to fatigue, natural modulator of the intestinal microbiome.

Indicated in: autoimmune diseases, metabolic disorders, diseases of the internal organs (liver, kidneys, lungs), hyperacidity, metabolic acidosis, metabolic syndrome, microbiome dysbiosis.

Administration: 740 ml of tea that is drunk daily.

Duration of treatment: in relation to the evolution of the disease (2-6 months).

Contraindications: there are not.

Side effects: they did not appear after long-term use.

Terms of validity: 2 years from the date on the prospectus; it is kept in the dark and at a constant temperature.

Other specifications: it can be used in parallel with the allopathic medication established by the attending physician.

The human body is densely populated by commensal and symbiotic microbes, the majority of the constituent microorganisms being bacteria. These microbes occupy different habitats such as gut, skin, vagina and oral. The genome of these microorganisms and their ecosystems constitute a microbiome. Factors such as diet, environment, host genetics and mode of delivery may be the reason behind the wide microbial diversity. The presence of the microbiome and

microbial products regulate the development and function of the immune system in the host (30, 31).

CONCLUSIONS

The gut microbiota is considered to be a master regulator of immune homeostasis. Besides modifying the gut microbiota, plants modulate the immune system in patients with autoimmune diseases. The utilization of such treatments, in individual or combined regimens, may manipulate the gut microbiota in a way that will prove to be a "game-changer" in modern medicine. A better understanding of the role of the microbiome in health and disease will help us harness the power of commensal bacteria for the development of novel therapeutic agents to treat autoimmune disorders.

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