



# Primary Nutritional Guidance at Systemic Lupus Erythematosus

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors EMK and JF of this paper carried out a bibliographic review research on systemic lupus erythematosus and presented the written version of the first part of the article. Author LCC prepared the nutritional guidance and menu for patients with lupus (primary condition). Author JMLNG reviewed the text, references and the final structure of the text. All authors did the final reading and approved this final version.*

## **Article Information**

DOI: 10.9734/JSRR/2020/v26i530256

### Editor(s):

(1) Dr. Chen Chin Chang, Hunan Women's University, China.

### Reviewers:

(1) Purohit Saraswati, Rajiv Gandhi University, India.

(2) Shikha Srivastava, Pt. Ravi Shankar Shukla University, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/57712>

**Short Research Article**

**Received 28 March 2020**  
**Accepted 05 June 2020**  
**Published 17 June 2020**

## **ABSTRACT**

**Aims:** To propose a primary nutritional recommendation for patients in the early stage of SLE to contribute to a better quality of life for those affected by the disease.

**Methodology:** This is a theoretical study, with no direct approach or intervention to any patient. The research was carried out using a conceptual approach based on a narrative and explanatory literature review. The main key descriptors of health were: Lupus and skin lesions; butterfly wing or arthritis, nutrition and lupus. After that, a diet (with a menu) for primary nutritional guidance to patients with early symptoms was followed.

**Results:** The scientific literature evaluates that Systemic Lupus Erythematosus (SLE) is a chronic, autoimmune inflammatory disease, with no cure, which can have multiple causes (hormonal, infectious, genetic and environmental). The production of autoantibodies in tissues, generated from recognized apoptotic fragments, processed and associated with the Principal Human Histocompatibility Complex are also characteristic of SLE. In addition, SLE is mainly characterized by the involvement of the skin, joints, kidneys and serous membranes. The symptoms of SLE vary

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according to the stage of the disease, affecting different organs, tissues and, in more severe cases, the central and peripheral nervous system. The incidence of SLE is about ten times higher in females and affects more commonly Afro-American, Hispanic and Asian people. In addition, the individual's eating habits and nutritional status can influence the intensity and worsening of symptoms. Regarding nutritional guidance, it is of utmost importance to have anti-inflammatory and antioxidant substances in the diet, avoiding the exaggeration of bad fats, refined carbohydrates, and proteins.

**Conclusion:** SLE patients should receive a multidisciplinary therapeutic approach, including follow-up by a nutritionist, who will prioritize the maintenance of the patient's adequate weight, avoiding overloading of his joints. This will contribute for a better quality of life for those affected.

*Keywords: Dietotherapy; lupus; pathology; immunology.*

## 1. INTRODUCTION

According to the Center for the Study of Autoimmune Diseases in Portugal [1], autoimmune diseases constitute a group with more than 100 related chronic pathologies. Although they have no proven specific cause, the main pathophysiology includes disorders in humoral and cellular immunity [2]. These ones can be divided into two classes: specific and non-specific; the specific ones refer to an autoimmune process directed against a single organ, and, on the other hand, the non-specific ones are directed to the systems, reaching different tissues, as is the case of Lupus [3].

Lupus is a chronic disease, remitting with recurrence. It is considered the classic prototype of multisystemic disease of autoimmune origin [4,5], characterized by the excessive formation of autoantibodies and immune complexes that mediate the inflammatory response in multiple organs [6]. Autoimmune diseases mainly affect women and systemic lupus erythematosus (SLE) also prevails in this group [7]. Nutritionally, for SLE, the contribution of nutrients in terms of diet therapy, as well as objective and subjective methods for assessing nutritional status, are important to assist in the reduction of symptoms caused by the disease [8]. Thus, the aims of this study were to analyze, identify and describe the main characteristics of SLE, as well as nutritional guidelines that can help in reducing associated symptoms. In addition, diet therapy is proposed for individuals with initial symptoms of the disease as primary guidance and contribution to improving the physical and mental condition of patients with lupus.

## 2. METHODOLOGY

This is a theoretical study, with no direct approach or intervention to any patient. The

research was conducted in two moments: initially a conceptual approach was carried out based on a narrative and explanatory bibliographic review. The focus was based on the literature to discuss about Systemic Lupus Erythematosus. We looked for research that included health descriptors, such as: Lupus and skin lesions; butterfly wing or arthritis, nutrition and lupus. In a second step, the construction of a diet (with menu) was developed for primary nutritional guidance for patients with early symptoms.

## 3. CONCEPTUAL FUNDAMENTALS

### 3.1 Historic

As reviewed by Dutschmann [9] in antiquity, around 400 years bC, Hippocrates named all skin lesions, including those eventually caused by Lupus, as "esthomenos herpes". According to Zimmermann [10] in 1859, Pierre Cazeneuve, found the presence of different types of lupus, including erythematosus, tuberculosis, ulceration, and hypertrophy. The systemic character, that is, relating the disease to multiple organs and tissues of the body, was first introduced only in 1872, by Moritz Kaposi and William Osler, whose descriptions included renal, cardiopulmonary, neurological, articular and hematological manifestations [10]. Thus, the term "systemic" was added to Lupus, as it is popularly known today.

### 3.2 Epidemiology

SLE has an estimated incidence that varies from 1.8 to 20 or more cases per year per 100,000 individuals worldwide [11]. Taking this same number into account, the lowest incidence occurs among American Caucasians and Canadians, and its most elevated in Asian and Afro-Caribbean individuals and, between 80-90% of these patients, the sex most affected is the

female of childbearing age (30 years) [11]. According to Costi et al. [12] the causes of mortality can vary according to the region of the country, which reflects the differences in care and access to health services. The authors analyzed that the mortality rate for SLE in Brazil is 4.76 deaths/105 inhabitants, being higher in the Midwest, North and Southeast.

### 3.3 Etiology

During normal tissue turnover, apoptotic cells are captured by dendritic cells to be transported to the lymph nodes where the process of tolerance to exposed antigens will occur [6]. According to Fonseca [3] studies associate SLE with failures in this system, allowing the organism to produce autoantibodies against elements of the nucleus, cytoplasm and plasma membrane. Autoantibodies are responsible for forming a heterogeneous set of reactivities with different specificities, since more than 180 types of autoantibodies can attack different organelles, cell types and constituents of the extracellular matrix; among them the best known, anti-DNA and anti-Sm, which are the specific serological markers of SLE [13].

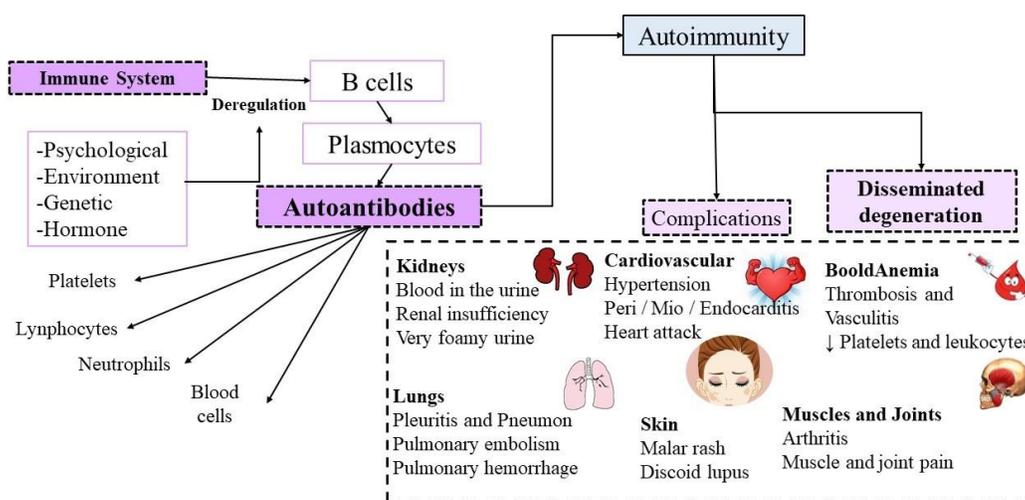
The accumulation of apoptotic remains in the germinal centers of the lymph nodes may provide the necessary stimulus for the survival of autoreactive B cells, leading to the secretion of autoantibodies predominantly of the IgG class [13].

### 3.4 Pathophysiology

Several studies highlight the physiological anatomy complications caused by systemic lupus erythematosus [14-17] in practically all systems of the human body (Fig. 1).

T cells play a fundamental role in the pathogenesis of SLE related to defects in signaling and effector functions; for example, reduced levels of interleukin and increased calcium influx [18,19]. In fact, the innate and adaptive immune system triggers actions in this process, maintaining autoimmunity to SLE [19].

According to data from the Brazilian Society of Rheumatology [17], in about 80% of cases, over the course of the disease, skin lesions appear. The most common and characteristic of systemic lupus erythematosus are reddish spots on the cheekbone and back of the nose, which are called butterfly wing lesions, which do not leave a scar. Some other types of skin lesions can occur due to light factors, such as the case of discoid lesions, as well as by inflammation of small vessels, such as vasculitis. The first is characterized by being very delimited, leaving scars with atrophy and changes in skin color. The second, can cause red or wine stains on the tips of the fingers or toes. Initially, the lesions have hyperpigmentation and evolve with an atrophic central area, with the absence of hair [20].



**Fig. 1. Main organs and clinical conditions associated with the development of systemic lupus erythematosus**

In most patients affected by SLE, there are cases of joint pain, stiffness and non-erosive or erosive deforming arthritis [15]. Renal impairment in SLE patients occurs in approximately 60% of cases, although its morbidity and mortality are still high, after all, the disease may progress to chronic renal failure causing the patient to require dialysis or kidney transplantation [21]. SLE can also compromise all components of the respiratory tissue, from the pleura to the airways. Some complications can reach more serious levels such as pleurisy, an inflammation of the tissues that line the lungs and rib cage, causing pain during breathing [22].

Regarding the cardiovascular system, cardiac injuries caused by SLE are usually associated with the deposition of immune complexes in the pericardium or myocardium, generating a pericarditis or myocarditis, as well as it can also affect the vessel or valve wall, resulting in endocarditis [23]. Estimated about 50% of patients with lupus have cardiac abnormalities, mainly contributing to an accelerated atherosclerosis [24]. Changes in blood cells are due to destruction by autoantibodies, and the consequences vary according to the affected cell. In the case of red blood cells, the patient will probably have anemia, while in white blood cells he will have leukopenia, and, on the other hand, if it occurs in platelets – thrombocytopenia [17].

Regarding the nervous system, in general, patients with SLE have the central nervous system (CNS) and peripheral system (SNP) compromised [25] (Table 1). The most common manifestation due to CNS inflammation is migraine, however, as it is a common complaint in the population, it is often not valued. Other symptoms may also occur, such as peripheral neuritis, seizures and behavioral disorders [11].

### 3.4.1 Diagnosis

At least four of the eleven clinical criteria defined by the Systemic Lupus International Collaborating Clinics [26] should be used to suspect or confirm SLE, at least one of which must correlate with one of the six immunological criteria (Table 2).

Although it is not the focus of this research, it is worth considering that drug therapy is conditioned according to the involvement and severity of each organ and system. For SLE patients, antimalarials are more commonly indicated, such as hydroxychloroquine and glucocorticoids [27].

## 3.5 The Systemic Lupus Erythematosus Patient

A partial description of a previously published clinical case is presented below to exemplify the severity of SLE and the need for an early and multidisciplinary therapeutic approach, at the beginning of the condition, with the indication of important measures regarding the disease to the patient so that they can live with the disease in the best possible way.

Almeida, Almeida and Souza [28] made a case study report in which some points are briefly described here, as an example of the clinical condition of a systemic lupus erythematosus patient: A 17-year-old female patient was admitted to the center specialized in pathologies, complaining in a municipality in the state of Paraíba (Brazil). The patient complained of pain and swelling in the joints, a complication that had appeared about six months ago. The patient was apathetic, pale, afebrile, photosensitive, with purple fingertips (Raynaud's phenomenon); showed signs of anorexia and hair loss due to the loss of 10 kg in the same period. Other indicative signs for Lupus were: arthritis in the elbows, wrists and knees; non-hemolytic anemia; lymphopenia; high erythrocyte sedimentation rate (ESR); 24-hour proteinuria with 2.500 mg/day indicating impaired renal function; positive antinuclear factor (ANA) (1:320); anti-DNA and anti-cardiolipin IgM positive; transthoracic echocardiogram showing moderate pericardial effusion. After a complete clinical evaluation, the diagnosis was positive for SLE.

## 3.6 Nutritional Recommendations

As reviewed by Borba et al. [4] autoimmunity and the inflammatory process of SLE are related to lipid profile and lipoprotein metabolism. This is because, patients with lupus have higher levels of triglycerides and low-density lipoproteins (LDL) associated with lower levels of high-density lipoproteins (HDL). Thus, those affected have a higher frequency of diseases associated with atherosclerosis, due to the greater risk of cardiovascular complications [27,28]. However, the relationship between nutrition and SLE remains undefined due to the multifactorial etiopathogenesis of the disease, which makes this relationship quite complex [29].

Nutritional recommendations for SLE patients are based on a diet restricted in calories and saturated fatty acids. In addition, foods rich in vitamin A, D and E, selenium, calcium, as well as

omega-3 polyunsaturated fatty acids (fish and vegetable oils) should be included in the diet [30]. Specifically related to vitamin D, there are indicators that the deficiency of this vitamin is more prevalent in patients with SLE, in addition to being associated with high levels of interleukin IL-6 and hematuria [31]. It is known that the eating habits and nutritional status of the individual can influence the intensity and the worsening of symptoms, therefore, SLE patients must follow some guidelines:

A) Daily Energy Needs - should be defined based on the patient's current weight, with the objective of obtaining and maintaining a healthy body weight [32]. Energy restriction can prolong life by reducing IgG secretion, which, in addition, inhibits the reduction of TCD4 + and TCD8+ lymphocytes [33].

B) Omega-3 Fatty Acid - the beneficial effects of omega-3, polyunsaturated fatty acid is already well described in the literature, particularly for the cardiovascular system [34]. Nutritional supplementation with omega-3 may constitute additional therapy to routine pharmacological treatment [35]. The diet composed of this element is linked to the stabilization of cell membranes and decreased synthesis of inflammatory mediators [34,35], control of blood pressure, reduction of triglycerides, increase in HDL and reduction of total cholesterol [36].

C) Zinc - zinc deprivation is associated with increased serum levels of corticosteroids and decreased production of auto antibodies, thus contributing to the control of the autoimmune response in patients with SLE [37].

D) Iron - excessive iron intake can cause an increase in proteinuria, causing serious kidney

damage and major tissue damage; in these cases, the use of chelators has been an alternative for autoimmune diseases [33,37,38].

E) Calcium and Vitamin D - the use of calcium and vitamin D is not exactly associated with the control of lupus disease, but it is of great interest in preventing bone loss. Lupus patients lose bone mass early through several mechanisms: action of proinflammatory cytokines that trigger bone resorption, as well as the use of drugs as anticonvulsants and, especially, corticosteroids [39]. In cases of osteoporosis in patients with SLE, the prevention of low bone mass it is essential to reduce morbidity and mortality [39]. Nutrients and foods that reduce the bioavailability of calcium (proteins, sodium, alcohol, and caffeine) should be considered when oriented to patients with SLE [40]. However, excessive calcium supplementation can result in effects such as kidney calculus, tissue calcifications, constipation and headache, as well as excess vitamin D are associated with tissue calcifications, nausea and kidney damage [41].

### 3.6.1 Anti-inflammatory diet for SLE

The menu of a patient with Lupus should be colorful and varied as much as that of a person who does not have the pathology, however, a greater focus should be given to foods that contribute to the "non-evolution" of the disease and, consequently, to the decrease side effects that medications can bring. It is extremely important to eat anti-inflammatory and antioxidant substances, avoiding the exaggeration of bad fats, refined carbohydrates and proteins. With the guidance of a nutritionist a menu suggestion was created for a patient with SLE based on the nutritional guidelines described in the research (Table 3).

**Table 1. Clinical manifestations of the central nervous system and system peripheral nerves associated with patients with systemic lupus erythematosus\***

<b>System manifestation central nerve</b>	<b>System manifestation peripheric nerve</b>
Headache	Autonomic disorder
Convulsion	Severe Myasthenia
Anxiety disorders	Mononeuropathy
Mood disorders	Cranial neuropathy
Movement disorders	Plexopathy
Cognitive disorders	Polyneuropathy
Cerebrovascular disease	Acute demyelinating inflammatory polyradiculopathy
Acute confusion state	
Aseptic meningitis	
Psychosis	
Demyelinating syndromes	

\* Adapted of Appenzeller [25]

**Table 2. Diagnostic criteria according to systemic lupus International collaborating clinics \* for suspicion or confirmation of systemic lupus erythematosus**

<b>Criteria</b>	<b>Features/Observations</b>
<b>Clinical</b>	
1. Acute cutaneous lupus	Injured patients
2. Chronic cutaneous lupus	Spotted or papular lesions, erythematous
3. Oral ulcers	Palate
4. Non-healing alopecia	Diffuse thinning or fragility of the hair with visible and broken hair;
5. Synovitis	Swelling or stroke or tenderness in two or more joints - thirty minutes or more of morning stiffness.
6. Serosite	Inflammation of the membranes covering the organs
7. Renal	Commitment, evaluation of proteinuria
8. Neurological	
9. Hemolytic anemia	
10. Leukopenia	
11. Thrombocytopenia	<4000 / mm <sup>3</sup> at least once;
<b>Immunological</b>	
1. ANA	Search for autoantibodies present in the serum of patients, if above the laboratory reference range.
2. Anti-dsDNA	
3. Antiphospholipid antibody: any of the following:	If above the laboratory reference range, except ELISA (Immunoenzymatic assay: twice above the laboratory).
4. Low complement	Injured patients
5. Direct test of Coombs	

\*SLLIC [26]

**Table 3. Suggestive menu for the basic diet for lupus patients with no severe clinical complications**

<b>Meal</b>	<b>Items</b>
Breakfast	Acerola juice with a teaspoon of wheat germ A glass of plain yogurt with oat bran
Morning snack	wo brown rice crackers with avocado paste A cup of green tea
Lunch	Brown rice Black bean A grilled chicken breast steak Green leaf salad with mango Dessert: 3 squares of chocolate (30g) half bitter
Afternoon Snack	A glass of skim milk (or oat / rice "vegetable milk") An apple Three almonds or walnuts
Dinner	Cream of pumpkin with ginger A slice of brown bread
Supper	A cup of chamomile / lemon balm tea Three whole grain cookies and gluten free

A) Breakfast - for the first meal of the day, one can opt, for example, for a glass of acerola juice, a fruit rich in antioxidants due to its high vitamin C index, replacing the classic black coffee. In addition, the intake of natural yogurt was indicated, as it contains a good amount of calcium, with oat bran, aiming to increase the fiber intake from the first meal, benefiting not only the intestine, but also preventing the appearance of cardiovascular diseases, like atherosclerosis.

B) Morning snack - in the first snack, two brown rice biscuits were chosen so that the patient does not eat gluten, after all, this protein present mainly in wheat flour has a great inflammatory capacity. In addition, the choice of avocado paste was due to the satiety that its unsaturated fats can bring to the patient.

C) Lunch - it was recommended to eat green leaves with mango due to the presence of an enzyme like papain, responsible for facilitating digestion, besides its antioxidant activity. Brown rice and black beans have been suggested due to the amount of fiber and iron present, as well as a grilled chicken steak that will add a good amount of protein without much associated fat. For dessert, dark chocolate was suggested, after all, it contains large amounts of flavonoids - a powerful antioxidant.

D) Afternoon snack - for the patient to have good sources of calcium available throughout the day, it was suggested to eat skimmed milk in conjunction with a fruit in the afternoon snack, in order to bring complex carbohydrates and fibers,

as well as the intake of some nuts or almonds, making up the daily need for good fats.

E) Dinner - in this meal, a cream of pumpkin with ginger is a good option due to its low glycemic index, preventing the pancreas of producing too much insulin. A slice of whole grain bread with a piece of ricotta, complement the meal by adding a good amount of protein in it.

F) Supper - calming teas such as chamomile or lemon balm are recommended along with whole-grain cookies and gluten-free, so the patient can improve his night's sleep, helping him / her in their treatment.

#### **4. CONCLUSION**

Although it is known about the set of nutritional and metabolic changes potentially implicated in SLE, the studies published in this regard are still insufficient. The importance of dietary guidelines for the lupus patient is indisputable, whether preventive or corrective. It is known that there is no specific and effective treatment for SLE.

Thus, the alternative is to try to further reduce mortality rates by controlling complications and associated diseases, especially those that arise in the long run. Therefore, the explanatory research in question is important insofar as the in-depth knowledge on the subject contributes to the realization of campaigns and awareness of the population to seek help earlier. Thus, there will be a better contribution to the patient's quality of life, after all, there are still many unanswered

questions, mainly regarding the signs and symptoms that are presented by the affected person and the inability to find an efficient diagnosis.

it is expected that the patient with SLE will need to have from a balanced nutritional diet. In this way, this will contribute to a more adequate physiological condition while conducting the treatment of your disease. Finally, it should be noted that a multidisciplinary team of health professionals and, particularly, the nutritionist has a fundamental role in improving the quality of life of patients affected by Systemic Lupus Erythematosus.

### ACKNOWLEDGEMENTS

We the authors of this article want to thank all the people who did the critical reading and review of the manuscript. Thank you.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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