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Review Article

Mindfulness and the Mediterranean diet as alternative therapies in ambulatory care of psoriasis

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ABSTRACT

Psoriasis is a chronic disease marked by intense inflammatory processes and a significant emotional effect. The progression of long-term emotional stress and poor dietary intake is a crucial factor; therefore, it's vital to have whole-person care. In this context, mindfulness appears to be rising as a viable cooperative strategy with the potential to promote emotional stability and enhance patients' wellness. This study aimed to evaluate the outcomes of holistic therapy supported by the mediterranean diet and mindfulness (MBI) through a review of up-to-date scientific research. A methodical research was conducted in the PubMed database using the keywords: "psoriasis," "types of psoriasis," "factors and psoriasis," "pathophysiology and psoriasis or inflammation," "mindfulness and psoriasis," "meditation and psoriasis," "cytokines and psoriasis," and "psoriasis diagnosis." Articles published between 2020 and 2025, in English or Spanish, with full-text access and peer review, were included. A total of 57 articles were considered. Evidence compiled over the most recent 5 years supports that mindfulness and the Mediterranean diet are successful therapies in psoriasis disease and, together, can improve outpatient healing and time to treatment, particularly by modulating the expression and activity of cytokines, such as TNF-α, interleukins (IL-1β, IL -6, IL-8, IL-10, IL-17, IL-23), IFN-γ, and cortisol levels. The implementation of the Mediterranean diet and mindfulness represents an effective and viable alternative in the outpatient treatment of psoriasis, with a positive impact on physical and emotional health.

Keywords: Psoriasis, Mediterranean diet, Mindfulness, Inflammation

INTRODUCTION

Psoriasis is a multifactorial autoimmune disease characterized by inflammation and proliferation of spherical papules and plaques on the skin, the skin lesions are erythematous and covered with silvery scales that flake off at an accelerated rate. As psoriasis develops, there is a continuous rise in the proinflammatory level of cytokines, especially interleukins (IL) and tumor necrosis factor-alpha (TNF-α).[1] Currently, there is no cure for psoriasis; nonetheless, there exists a variety of pharmacological strategies targeted at managing the clinical signs and symptoms.[2] In clinical practice, diagnosis is based on the use of techniques that support the assessment of severity, among which the determination of body surface area (BSA) stands out. Additional medical techniques widely used in practice are biopsy and Brocq's methodical scraping, which aids a more accurate diagnosis. Unfortunately, lack of access and untimely detection delay early treatment. It's estimated that 60 million people

worldwide are affected by this health issue. The age range for psoriasis is between 30 and 60 years of age in men; whereas in women it can appear between 20 and 60 years of age.[3]

Commonly, the well-being of people with psoriasis is altered due to the evident skin lesions along with intense pruritus, insomnia, and the manifestation of mental health issues such as depression, anxiety, and suicide.[4] MBI or meditation is a practice that emphasizes concentrating on the immediate awareness, free of judgment. MBI is considered a well-proven non-pharmacologic technique for stress management, and has shown advantages in a variety of clinical conditions, including chronic inflammatory diseases. MD has been widely studied for its positive effects on health. In particular, certain nutrients help reduce inflammation and oxidative stress, key processes in psoriasis, and contribute to body weight control, especially in cases of overweight or obesity.[5] The objective of this review is to summarize the features of MBI in combination with a MD which could be applicable to the etiology of psoriasis, aiming specifically at inflammatory processes and lessening its clinical signs.[6] This would seem to be suitable for putting these interventions into practice in outpatient settings, given that this context facilitates continuous education, empowers daily practice, and influences healthy habits, autonomy, prevention, and self-care, as it is known that in the hospital setting there are some limiting factors in terms of the food options and also the length of the hospital stay may be brief.

METHODS

A literature search was performed in PubMed using the terms “psoriasis,” “types of psoriasis,” “factors and psoriasis,” “pathophysiology and psoriasis or inflammation,” “mindfulness and psoriasis,” “psoriasis diagnosis,” “meditation and psoriasis,” and “cytokines and psoriasis.” The scope in terms of the publication scrutinized was between 2020 and 2025 due to the justification that the evidence from the last 5 years is more up-to-date, verifiable, and suitable for validating or amending previous insights. Studies in Spanish and English were included, with access to the full text as well as those which met peer review criteria. Randomized controlled clinical trials, cohort studies, meta-analyses, and review articles were selected. Manuscripts were selected by reviewing the titles, abstracts, or full texts. A total of 57 articles were assessed, underlining the importance of psoriasis, types, factors, diagnosis, and the use of mindfulness as a treatment in patients with psoriasis.

PSORIASIS

Psoriasis is a chronic inflammatory autoimmune disease marked by hyperproliferation and abnormal differentiation of keratinocytes (KC), the main cells of the epidermis.[7] Usually, KCs divide by mitosis to form two new cells that mature and ascend to the upper layer and finally to the stratum corneum, where keratinization is finished. Following this, near 28 days after forming the basal layer, they expire and slough off. This is the lifespan of KCs in healthy skin. But in psoriatic skin, this process is incomplete, as it only lasts between 3 and 7 days, resulting in an excessive aggregation and development of hyperplastic skin, clinically manifested by thick plaques and abundant scales (Figure 1).[8] In clinical practice, plaque psoriasis or vulgaris is the most common form, with an estimated prevalence of 3%; guttate psoriasis is present in 0.5% of the general population and 2% of the pediatric population.[9,10] Epidemiologically, pustular psoriasis affects 3% of the world's population; nail psoriasis is prevalent in 10% to 82% of the population with psoriasis, between 3% and 7% have flexural psoriasis, and erythrodermic psoriasis accounts for between 1% and 2% of patients with psoriasis (Table 1).[11-14] In general, in psoriatic plaques there is a synergistic interaction among the components of innate and adaptive immunity which occurs in a dysregulated form. In the context of classical immunology, antigen-presenting dendritic cells, KC, neutrophils, macrophages and NK cells are involved, which can modulate the immune response via specific receptors called killer cell immunoglobulin-like receptors (KIRs).

A particular type of the human leukocyte antigen (HLA), known as HLA-Cw6, plays a role as a natural ligand for the KIR2DL1 receptor, expressed on NK cells and some T lymphocytes. The atypical interaction between HLA-Cw6 and KIR2DL1 is capable of changing the function of these immune cells, promoting the chronic and dysregulated activation that is characteristic of the immunopathogenesis of psoriasis.[19] The activation of dendritic cells in the dermis and epidermis, which is seen in the two phases of psoriasis, initial and aggravated, exhibits a set of inflammatory changes, highlighting the overproduction of cytokines such as TNF-α and IL-23, which promote the development of T cell subsets, Th1 and Th17, which later release proinflammatory mediators such as IL-17, IFN-γ and IL-22, which induce vascular and epidermal alterations.[20]

PSORIASIS TRIGGERS

Factors triggering psoriasis comprise dietary factors such as consumption of saturated fats, simple carbohydrates, red meat, alcohol, overweight and obesity through increased leptin concentration in adipose tissue, which results in the activation of dendritic cells, granulocytes, macrophages and T cells by the ongoing pro-inflammatory process that occurs (Table 2).[21-23] Regardless of those factors which can activate psoriasis, a physiological condition which also increases cell proliferation, inflammation and impairs the function of KCs and fibroblasts is oxidative stress, either way by increased reactive oxygen species (ROS) or nitrogen (RNS) that induce transcription factors and other reactions linked to functions such as cell proliferation, autophagy and apoptosis.[39]

Table 1: Varieties of psoriasis and its individual features.

Variety	Etiology	Clinical manifestations	Reference
Plaque psoriasis or vulgaris	More common in people with psoriasis. The skin condition is generally mild to moderate in intensity. It appears near the elbows, knees, lumbosacral area, and scalp This event intensified proliferation, causing an increase in the activity of phosphodiesterase-4 (PDE4), an important enzyme regarding immune homeostasis, which resulted in altered levels of pro-inflammatory mediators such as IL-17, IL-23, IFN-γ, and TNF-α.	Pruritic plaques with silvery scales.	9,12
Guttate psoriasis	This condition typically occurs in children and young adults, representing 0.5% and 2% of the pediatric population, and can spontaneously disappear within 3 to 4 months; however, in certain cases it can become chronic psoriasis. The skin manifestation is usually present on the chest as well as the arms and legs. This is caused by a streptococcal infection such as pharyngitis or tonsillitis. In this type of psoriasis, an immune dysregulation is triggered in T cells, specifically in CD4+ and CD8+. Th1 cytokines, such as IFN-γ and IL-2, are significantly increased, as are IL-1, IL-6, and TNF-α, while anti-inflammatory Th2 cytokines, such as IL-10, are decreased, leading to inflammatory processes.	The lesions are visible with small lesions with plaques in the form of drops 2 to 10 mm in diameter, erythematous, scaly, and pruritic.	10, 15,16
Ungual Psoriasis	Psoriatic nail disease occurs as a result of a structural change in the ungual bed or matrix, it has a prevalence of 10% to 82%, concerning the varieties of psoriasis this is one of the hardest to treat with medicine, even though its common location, possibly caused by its biological evolution with no sign of cutaneous manifestations and the difficult penetration of topical treatments, its etiology has not been discovered with precision; however, it has been suggested that inflammatory processes can affect the nail bed or the nail matrix due to the dysregulation of innate immunity.	This is marked by nail pitting, color changes in the nail plate, leukonychia, onycholysis, onychoma-desis, salmon spots, subungual hyperkeratosis, and splinter hemorrhage, trachyonychia.	12
Pustular psoriasis (PP)	This is capable of manifesting as localized or generalized. In a localized form, it can be segmented into two types, palmo-plantar pustulosis (PPP) in which pustules will manifest on the affected palms of the feet and hands, alongside the other type which is known as acrodermatitis continua de Hallopeau (ACH) which has alteration of the ungual nail complex. It is caused by a hyperactivation of the innate immunity with an alteration in IL-36 that triggers an excessive production of inflammatory cytokines leading to an increase in chemokines and neutrophil mobilization in the epidermis.	Manifestation of sterile neutrophil-rich pustules.	11, 17
Flexural psoriasis	The incidence of this skin condition is infrequent, reaching between 3% and 7% of patients with psoriasis. The lesion could be detected in areas such as the axilla, intergluteal area, groin, sub-mammary region, genitalia. The disease's patho-physiology is caused by the complex interaction between T cells, dendritic cells and KCs elevating the IL-23/IL17 axis, a key system in the regulation of immune responses to chronic inflammation.	Erythematous plaques of bright aspect with poor skin peeling near the skin bends and bad odor.	3, 13
Erythroderm -ic psoriasis (EP)	This is considered the most acute and the least common, affecting 75 to 90% of the body surface. It's driven by poorly managed plaque psoriasis and its pathophysiology is similar to that of plaque psoriasis, but the serum levels of IL-13 and IL-4 are considerably higher in PD.	Erythroderma is observable with symptoms such as pruritus, fever, dehydration, arthralgia, asthenia,	14, 18

Continued.

Variety	Etiology	Clinical manifestations	Reference
		lymphadenopathy, fatigue, tachycardia, insomnia, headache, chills, malaise, staphylococcal infection, weight changes.	

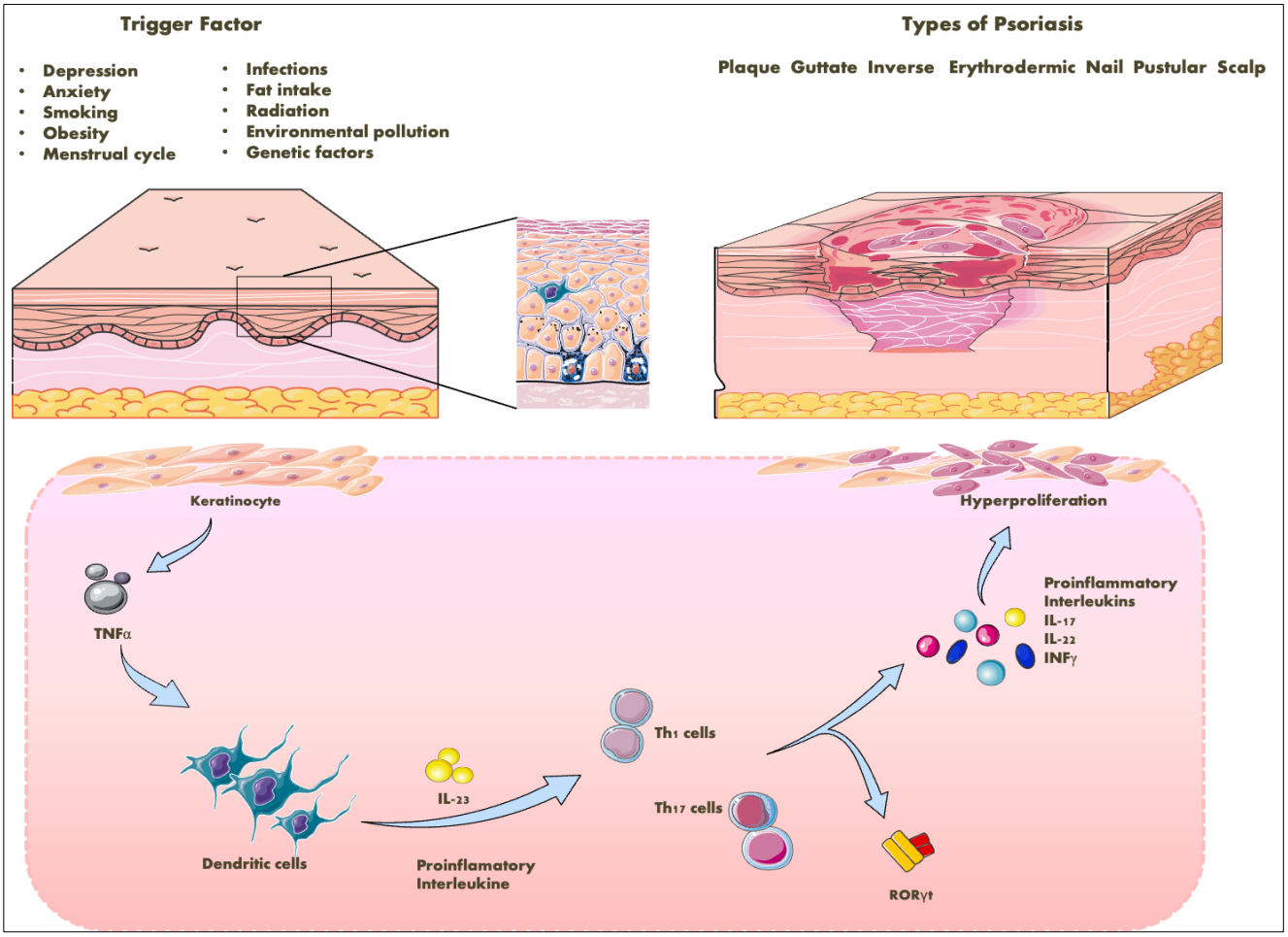

Figure 1: General synopsis of psoriasis.

At the upper left are located the triggering factors of this disease related to keratinocyte hyperproliferation. At the upper right part, all the varieties of psoriasis are listed. In the base layer of the image, the activation of dendritic cells in the dermis and inflammatory changes are described, highlighting the overproduction of cytokines such as TNf-α and IL-23, which promote the development of t-cell subsets, Th1 and Th17, which in turn secrete proinflammatory mediators such as Th-17, IFN-γ and IL-22, all of which promote vascular and epidermal alterations

Table 2: Main factors related to psoriasis.

Factors	General description	References
Genetics		
RORγt	Overexpression of this gene induces Th17 cells releasing proinflammatory cytokines such as IL-17, IL-6, IL-1β, and IL-23.	25
HLA-C∗06:02	This allele exhibits a high affinity for short peptides (9 amino acids) with hydrophobic residues and arginine, this activates autoreactive T cells, leading to the progression of the disease.	26
CARD14	This gene is highly expressed in KCs and encodes a protein that promotes the nuclear factor kappa B (NF-κB) pathway. In normal conditions, NF-κB is inactive in the cytoplasm, bound by its inhibitor IkB. When signaling is activated, IkB is phosphorylated by IKK kinase, leading to its degradation and allowing NF-κB to move into the nucleus to activate transcription of proinflammatory genes.	27

Continued.

Factors	General description	References
Dietary		
Saturated fatty acids (AGS)	AGS carried in the bloodstream are transported to the cutaneous tissue and promote the activation of myeloid dendritic cells (DC), inducing the synthesis of IL-1β and subsequently stimulating KCs, promoting the recruitment of polymorphonuclear leukocytes, mainly neutrophils and monocytes, to the dermis. Leading to the polarization of T cells into Th1 and Th17.Contributing to the persistent pattern of psoriatic dermatitis. Excess lipid promotes ROS accumulation, which induces ferroptosis in KC through lipid peroxidation. Th17/Th22 is activated and enhanced by endoplasmic reticulum stress, contributing to cellular dysfunction and aggravation of cutaneous inflammation.	28,29
Polyunsaturated fatty acids (Omega-6)	Acts through inducing an immune response of T-helper lymphocytes, in Th1 and Th17 subtypes, enhancing the concentration and generating a wide variety of pro-inflammatory cytokines such as IL-1, IL-6, IL-23, IL-22, IL-17 e IL-33, TNF-α and, IFN-γ	29
Environmental		
UV radiation	The radiation generates cellular damage mediated by ROS and RNS, which induce oxidation of DNA, lipids and proteins activating various inflammatory pathways, such as NF-κB and MAPKs, which perpetuate inflammation and tissue damage.	30
Polluted air	ROS production in KCs is also increased by exposure to environmental oxygen and toxic metabolites, which exacerbates the inflammatory response. High prooxidative markers and disturbed antioxidant enzymes such as PON1 and SOD contribute to the redox imbalance.	30
Smoke cigarette	Cigarette combustion emits an overwhelming number of free radicals and reactive oxygen species (ROS), which disrupt the cellular redox state, resulting in oxidative damage processes to lipids, proteins and DNA by activating various intracellular signaling cascades. These include MAPK, NF-κB and Jak-Stat and are linked to keratinocyte hyperproliferation, epidermal barrier dysfunction and infiltration of immunocompetent cells. Regulates gene expression, such as HLA-Cw6, HLA-DQA1*0201 and CYP1A1, suggesting significant gene-linked environmental interaction. The activation of the aryl hydrocarbon receptor (AhR) in Th17 and Th22 T cells, leading to overexpression of key proinflammatory cytokines such as IL-17 and IL-22.	31
Biological		
Menstrual cycle	A rise in androgen levels and a decrease in estrogen levels can lead to cutaneous sebum production and contribute to the inflammatory response. This condition triggers the worsening of psoriatic lesions, resulting in a catamenial dermatosis.	28, 32
Infection	Bacterial (Streptococcus, Staphylococcus aureus and Helicobacter pylori), viral (human immunodeficiency virus (HIV), hepatitis virus, human papillomavirus (HPV), cytomegalovirus (CMV), Zika virus (ZIKV) and severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]) and fungal (Malassezia and Candida). Each one of these infections shares the capability to activate the response of the immune system, especially the T cells that are crucial in the pathogenesis of psoriasis, hence can induce the disease or intensify the lesions	33
Pathological		
Koebner phenomenon (KP)	Release of nucleic acids from KCs, which activates an immune response mediated by TLR7, TLR9 and TLR3, inducing the production of IFN-α and IFN-β, which promote inflammation and the development of psoriasis.	28
Obesity, IMC <25	An excess of fat tissue manifests endocrine functions synthesizing proinflammatory adipokines such as leptin and resistin, as well as proinflammatory cytokines such as TNF-α and IL-6.	34
Drugs		
First-choice drugs	Beta-blockers, antivirals, antidepressants, lithium, synthetic antimalarials such as chloroquine and hydroxychloroquine, non-steroidal anti-inflammatory drugs (NSAIDs), interferons and terbinafine, antibiotics (especially tetracyclines), ACE inhibitors. All of the mentioned all exhibit a similar reduction of intracellular levels of cyclic adenosine monophosphate (cAMP) which leads to hyperproliferation of KCs as well as a change relating to their terminal differentiation mechanisms, leading to	32, 35

Continued.

Factors	General description	References
	abnormal and disrupted epidermal growth, hence promoting the appearance of psoriatic skin plaques.	
Psychological		
Depression	Patients suffering from moderate to severe depression have a significant risk of developing psoriasis because they had increased concentrations of proinflammatory cytokines, such as TNF-α, IL-1β, IL-6 and C-reactive protein (CRP).	36
Self-perception	73% of people who have feelings of low self-esteem, distorted body image, reduced quality of life influencing social, sexual and work life, develop some type of psoriasis.	37
Emotional stress	The hypothalamic-pituitary-adrenal (HPA) axis secretes corticotropin-releasing hormone (CRH), and stimulates the pituitary gland to release adrenocorticotropic hormone (ACTH), the hormone that regulates the secretion of glucocorticoids, mainly cortisol, from the adrenal glands. In psoriasis, low cortisol levels are observed, causing hyperactivity of the immune system and increased inflammatory response. Low levels of 5-HT and DOPA increase the production of inflammatory mediators, such as TNF-α and IL-1β.	38

CLINICAL DIAGNOSTIC TECHNIQUES

Psoriasis is classified according to the level of severity of skin involvement, for which different techniques are used in clinical practice to measure the area of the lesion. One of the most common is the determination of the BSA, which allows measuring the erythematous lesions, induration and desquamation of the same, generally the palm of the patient's hand is used as an indicator of the level of surface damage, since it represents 1% of the body extension.[3,40] In clinical practice, psoriasis is considered mild when the BSA value is 3%, moderate psoriasis when it affects between 3 to 8% and severe psoriasis when the value is more than 10%.[41] Although this technique is easily accessible, some healthcare providers examine the patient and according to their judgment and previous medical impressions, make their diagnosis. This is a risky practice, because depending on the increase in BSA, the risk of developing new diseases, including cardiovascular, cerebrovascular and diabetes, may increase.[42]

On the other hand, the psoriasis area and severity index (PASI) is another technique used in the second level of care due to its complexity and is commonly applied in dermatology. Briefly, this scale gives a score according to the severity of the skin lesions, four areas of the body are evaluated: head and neck, arms, trunk and legs. In each region, three key features of psoriasis are assessed: redness, plaque thickness and scaling, on a scale from 0 (absence) to 4 (maximum severity). Then, it is calculated how much of everybody area is affected, scoring according to the proportion involved. Finally, the severity score is multiplied by the area score to obtain a specific result by region, due to its complexity and the fact that experience is an important factor for the evaluation, this is only performed by dermatology specialists and finally its evaluation ranges from 0 (no presence of the disease) to 72 (severe case), being a valuable tool to measure how the patient responds to psoriasis treatment.[1,43]

Another important technique is the methodical scraping of Brocq, which consists of curettage of a psoriatic plaque, managing to detect three signs: the sign of the stearin candle, where dry, white flakes that flake off the skin easily are obtained; the sign of the unfolding membrane, which is marked by the appearance of an epidermal film of brownish-white, wet texture with variable thickness, and the sign of the blood-soaked film or auspitz sign, where a bleeding spot appears in small drops at the base of the psoriatic plaque and erupts after the peeling of the membrane of Duncan-Dulckley, this is recognized as a pathognomonic sign. Irrespective of the chosen technique for diagnosis, a clinical history is taken, skin inspection is performed and a biopsy may be performed to confirm the presence of psoriasis.[44]

Finally, a different significant tool for psoriasis patients that has an impact on their quality of life, not quite as much as diagnosis, is the dermatology life quality index (DLQI), a life quality assessment consisting of a 10-item questionnaire which includes questions concerning symptoms and feelings, daily activities, leisure, work, studies, personal relationships, and treatment. Each question is scored from 0 to 3, where 0 means no effect at all, 1 means a slight effect, 2 means a significant effect, and 3 means a very significant effect. A score of 0 is equal to no deterioration in quality of life, a score greater than 10 would indicate a moderate effect, and a score of 30 would indicate a severely reduced quality of life.[45]

NON-PHARMACOLOGICAL TREATMENTS FOR PSORIASIS

Mindfulness

Also, known as MBI, meditation, or reflection, this non-invasive practice seeks to connect personal awareness with the environment from a neuroscientific approach, consciously observing the present moment, adopting an attitude of curiosity, openness, and acceptance, and abstaining from criticism or reaction to new experiences that emerge.[46] This practice consists of a variety of techniques designed to cultivate mental well-being, which are divided into two categories: physical activity focused

on conscious movements, which integrates yoga, walking meditation, body scanning, and breathing; and internal attention based mainly on relaxation and body awareness, which also integrates sitting meditation, meditation exercises combined with cognitive behavioral techniques that identify negative thoughts to transform them into optimistic thoughts, group dialogues, and psychotherapy. Its effectiveness has been suggested in various pathologies such as anxiety, depression, improvement in harmful behaviors such as opioid and alcohol use, and behavior in attention deficit hyperactivity disorder, improving adherence to pharmacological treatment, as well as an important complement to therapies for people with cancer or cardiovascular diseases.[47]

The human brain possesses the adaptive capacity to transform and reduce negative thoughts. Studies employed magnetic resonance imaging have shown changes in brain activity and structure, especially in the hypothalamus, by improving stress regulation, the prefrontal cortex related to decision-making and self-control, and the limbic system, including the amygdala and hippocampus, wherein it has been detected that the amygdala is less activated by negative stimuli.[48] Meditation has also been associated with reducing telomeres, showing positive effects in slowing age-related brain aging in young and middle-aged people. Clinical studies have also shown that it improves immune health by decreasing IL-6 concentration, promoting wellness such as autoimmune hepatitis, chronic low back pain due to symptomatic discopathy, psoriasis, inflammatory bowel disease, fibromyalgia, and rheumatoid arthritis.[6]

Use of mindfulness for psoriasis treatment

Mindfulness-based stress reduction (MBSR) has been demonstrated to be highly effective, focusing on sensations and behaviors to highlight personal autonomy, allowing individuals to organize, decide, and act without depending on others. Therapies based on the MBSR program have been shown to be effective in reducing stress, anxiety, and depression levels in older adults with psoriasis. Studies indicate that these practices improve adaptation strategies and quality of life, with sustained effects subsequent to treatment. A 10-week controlled trial evaluated the effects of three interventions: health education, psychotherapy, and MBSR in hypertensive patients with symptoms of depression and/or anxiety. The study included 30 participants (8 men and 22 women) and showed positive results: a reduction in depression and anxiety levels, a decrease in systolic blood pressure, and an improvement in patients' self-efficacy scores. A systematic review of the English-language literature on mind-body interventions as alternative and complementary therapies for psoriasis found that techniques such as visualization exercises, meditation, and cognitive-behavioral stress management produce mild to moderate clinical improvements. The study included 51 patients with psoriasis vulgaris, who were randomly assigned to a treatment group or a control group. Participants in the treatment group showed significant improvements in clinical indicators such as PASI, total sign score (TSS), and Doppler blood flow to psoriatic plaques.[49] A clinical trial studied the effects of a two-week intervention that combined psychological therapy, MBSR medical treatments, phototherapy, and progressive muscle relaxation in a group of 39 patients (14 men and 25 women). The results showed an increase in self-compassion, emotional resilience, and quality of life. In terms of skin condition, both groups experienced improvement during the interventions. In a randomized controlled clinical trial, 92 patients with psoriasis, aged 16 years and older, who were experiencing emotional distress were evaluated. Over a four-week period, participants underwent a compassion-based self-help intervention, which consisted of reading informational leaflets and listening to sound files with guided exercises. The results were positive, showing a significant reduction in extreme shame and self-criticism, as well as an increase in self-confidence and an improvement in the DLQI index.[50]

A pilot study evaluated the effectiveness of an 8-week MBSR program focused on therapeutic breathing and synchronized yogic movement, combined with cognitive and behavioral methods focused on self-control and healthy decision-making. This intervention was combined with the use of immunosuppressive medication in 17 patients diagnosed with autoimmune hepatitis (AIH). The results showed a significant decrease in proinflammatory cytokine levels, including IL-6, IL-8, IL-10, IL-17, IL-23, as well as in the sCD74/MIF ratio. The latter, macrophage inhibitory factor (MIF), is a key mediator in both the psychological stress response and immune inflammation in AHI. Besides, an observation of increased stress levels, a reduction in the dose of immunosuppressive drugs, and a decrease in alanine aminotransferase (ALT) levels, an indicator of liver activity, were observed.[49] In a study of 70 patients with low back pain conducted in nine MBSR sessions, cortisol increase was attenuated, and a significant decrease in the proinflammatory cytokine IL-1β was found, as well as a reduction in depression, stress, perceived pain, an increase in quality of life in relation to sleep quality, an increase in physical function, and life satisfaction.[50] An experimental control study was performed to examine the effects of an MBI-based intervention in patients with end-stage renal disease. The study lasted 8 weeks and involved 62 participants, divided into two groups-31 in the experimental group and 31 in the control group. During hemodialysis sessions at the hospital, patients in the experimental group practiced the protocol developed by Smith in 2005 for 30 minutes, three times a week. The results showed a significant decrease in C-reactive protein (CRP) levels, a marker of inflammation, as well as a notable reduction in tumor necrosis factor alpha (TNF-α) levels, suggesting an anti-inflammatory effect associated with the practice. In a study conducted with patients diagnosed with Parkinson's disease, participants were assigned to two intervention groups. One group, consisting of 53 people, practiced meditation, while the other group, consisting of 52 patients, participated in

yoga sessions. Both interventions were carried out for 8 weeks, with 90-minute sessions. At the end of the study, significant improvements were observed in both groups, including a reduction in anxiety symptoms, an improvement in health-related quality of life, and a decrease in serum levels of the proinflammatory cytokine IL-6. In a study called MBSR versus Escitalopram for the treatment of adults with anxiety disorders, the intervention was carried out over 8 weeks with daily 45-minute practices. Participants were divided into two groups: 102 received MBSR and 106 received escitalopram, with an average age of 33 years. The results were favorable; MBSR reduced anxiety as much as escitalopram, demonstrated a strong response, and was equally effective.

ANTI-INFLAMMATORY PROPERTIES OF MEDITEREANEAN DIET

As described above, environmental factors commonly influence the chronicity and success of treatment in psoriasis. Among these factors, diet and the consumption of certain nutrients play an important role in reducing inflammatory processes and oxidative stress. One of the most widely described diets is the MD, which not only has an impact on the disease but besides some comorbidities such as overweight or obesity that exacerbate the problem.[5] For psoriasis, the nutritional contribution of certain foods is important, mainly antioxidants due to their anti-inflammatory properties that may have on the skin.[51] Some studies on foods that may have an important effect are described below.

Salmon is a good source of omega-3 fatty acids: eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and docosapentaenoic acid. Its wide range of benefits include anti-inflammatory, immunomodulatory, and antioxidant effects, as they inhibit the synthesis of the inflammatory leukotriene B, which in turn reduces inflammatory lesions.[51] In a study conducted in cell culture and in vitro, showed key findings where EPA and DHA act as neuroprotective agents by counteracting the toxic effects of inflammatory cytokines associated with depression (IL-1β, IL -6, and IFN-α), preventing both the decrease in neurogenesis (marked by DCX+ and Map2+ cells) and the increase in apoptosis (CC3+ cells).[52] Red wine consumption (2–7 servings per week) has been shown to have antioxidant effects due to its high polyphenol content. These compounds increase the activity of antioxidant enzymes such as catalase (CAT), superoxide dismutase (SOD2), and glutathione peroxidase (GPX1), facilitating the reduction of reactive oxygen species (ROS), suppressing NF-κB activation, diminishing proinflammatory cytokines such as IL-6 and TNF-α, and decreasing inflammatory biomarkers.[53] Oat-based cereals have been shown to decrease interleukin-10 (IL-10) and inhibit the expression of mRNA and proteins of proinflammatory factors such as TNF-α, IL-1β, IL-6, and iNOS. Nuts (hazelnuts, almonds, walnuts, pistachios, among others) contain gallic acid, a phenolic acid with antioxidant and anti-inflammatory properties. This compound regulates the inflammatory activity of T lymphocytes and macrophages/microglia, and reduces the release of interleukin-17 (IL-17) and interferon gamma (IFN-γ) by T lymphocytes. This compound has been shown to inhibit the production of several proinflammatory cytokines, including IL-4, IL-5, IL-17, IL-6, IL-1β, IL-12, IL-23, and TNF-α, by acting on cellular signaling pathways such as NF-κB. Grapes and cranberries contain resveratrol, a powerful antioxidant that has been shown to have anti-inflammatory properties that prevent the secretion of IL-2, MCP1, IL-8, and IFNγ. White beans and light red beans have been shown to reduce inflammatory markers such as IL-8 and TNF-α.

SYNERGY OF MINDFULNEES AND MEDITERRANEAN DIET IN COMPOUNDS OF PSORIASIS

MBI-based intervention combined with healthy eating and sustainable nutrition has shown itself to be an effective strategy for cognitive processes, cardiovascular conditions, eating disorders, overweight, etc. This type of practice supports individuals in reconnecting with their internal physiological conditions such as hunger and satiety, displacing the dependence on external stimuli that usually guide modern food consumption in excess. Likewise, MBI has been seen as positive in changing eating behaviors and, therefore, in people's health status. Also, its benefits in promoting healthy lifestyles and withdrawal from negative environmental factors such as smoking and alcoholism, which interfere with commitment to dietary treatment or healthy aspects in people, have been described.[54] On the other hand, the application of MBI with some types of diets, such as the MD, has been shown to have a positive impact on health factors. For example, in a randomized clinical trial of 1,184 pregnant women at risk of preterm birth, who received MBI (2.5 hours per week for 8 weeks) and a MD (provisions of extra virgin olive oil and nuts) showed that both interventions were effective in significantly reducing the proportion of small for gestational age (SGA) newborns (birth weight below the 10th percentile). In addition, a reduction in severe SGA (below the 3rd percentile) was observed. In the MBSR group, notable improvements were found in maternal anxiety and well-being levels, as well as a decrease in cortisol and some pro-inflammatory cytokines, which was reflected in improved placental function. There was also an average increase of 100 grams in birth weight, a clinically relevant change that has been associated with a 7% reduction in the risk of developing diabetes in adult life.[55]

In another study performed over two years on pregnancy and child cognitive development, 1,221 pregnant women at risk of PEG participated and were divided into three groups: MD (olive oil and nuts), MBSR (eight 45-minute sessions), and usual care (no special intervention). At 24 months of age, the cognitive and socio-emotional development of the children was assessed using the Bayley-III scale, demonstrating that children in the MD

group had positive changes in cognitive development and in the socio-emotional area, while the MBSR group only presented enhancements in socio-emotional development.[56] Finally, a 3-year study was conducted to learn about the MD and MBSR during pregnancy and their influence on the brain development of newborns. A total of 147 pregnant women were recruited and divided into three groups: MD with educational-focused sessions, free olive oil and nuts, MBRS group with an 8-week 45-minute program, and usual care without intervention. In addition, 692 infants (1-3 months old) were recruited to assess brain development. The interventions had significant changes in neonatal and fetal brain development.[57]

This scientific evidence can help us better understand the relationship between MBI combined with other therapies such as dietary changes, which might be useful to study more in-depth, given the growing interest in mental health and forms of relaxation that are important in modern life and that trigger stress-related problems such as psoriasis. Future clinical studies are needed to understand the impact of MBI on modifiable habits such as diet.

CONCLUSION

The integration of MBI for 45 minutes daily, as recommended in modern literature, for more than 8 weeks as part of a comprehensive non-pharmacological approach, has been shown to be the period of time during which these MBI interventions have a significant impact on psoriasis in outpatients in combination with a MD are able to be provided as an effective complementary approach to reduce inflammation processes and shorten the recovery period for people with psoriasis, impacting the decrease in the PASI index, reduction of inflammatory cytokines such as TNF-α, IL-6, IL-8, IL-10, IL-17,1β IL-23, decrease in cortisol levels, and improvement in dermatological quality of life.

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