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ORIGINAL ARTICLE

Exploring the Interconnection Between Psoriasis and Metabolic Syndrome: A Comprehensive Analysis

[1]Anup Goyal, [2]Preeti Jakhar

[1,2]Assistant Professor, Department of Skin & VD, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

ABSTRACT:

Background:Psoriasis is linked to notable morbidity, potentially exerting a considerable influence on patients' quality of life, even when affecting a relatively small body surface area. The objective of this study was to examine the correlation between psoriasis and metabolic syndrome. Additionally, the research aimed to assess the disease activity and duration in psoriatic patients, comparing those with and without metabolic syndrome.**Methods**:The study incorporated 170 subjects with psoriasis who had not undergone systemic treatment in the preceding two months. Comprehensive assessments, including a full lipid profile, fasting blood glucose levels, blood pressure measurements, and an evaluation of central obesity, were conducted to formulate the results.**Results**:Among the 170 patients, 66 were found to have metabolic syndrome. Notably, 60% exhibited impaired HDL levels, and 55.2% showed fasting triglyceride abnormalities within the metabolic syndrome group. The study revealed a direct association between metabolic syndrome and the extent of body surface area affected by psoriasis. Patients with psoriasis lasting over 70 months demonstrated a higher prevalence of metabolic syndrome, accounting for 37.84%. Interestingly, no significant correlation was observed between the Psoriasis Area and Severity Index (PASI) score and the presence of metabolic syndrome.**Conclusion**:In summary, the current study establishes a clear association between psoriasis and metabolic syndrome. This finding holds significant implications within the field of dermatology, emphasizing the need to address and manage this correlation to prevent potential serious complications.

Keywords: Dyslipidemia, Hyperglycemia, Metabolic Syndrome, Psoriasis, Psoriatic complications, Obesity.

Corresponding Author: Preeti Jakhar, Assistant Professor, Department of Skin & VD, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

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INTRODUCTION

Psoriasis, a chronic skin disorder characterized by inflammatory cell infiltration, hyperproliferation of epidermal cells, and dilated microvessels, presents a multifaceted condition affecting an estimated 0.1–3% of the global population.[1] Its etiology is intricate, involving a complex interplay of genetic predisposition and environmental factors.Metabolic syndrome, a constellation of health conditions encompassing central obesity, dyslipidemia, glucose intolerance, and elevated blood pressure, is intricately linked to psoriasis. The pathophysiological underpinnings of metabolic syndrome primarily revolve around insulin resistance mediated by adipocytokines such as tumor necrosis factor (TNF)-alpha, leptin, and adiponectin. This syndrome, known for its association with cardiovascular disease and type 2 diabetes mellitus, finds its roots in the physiological consequences of impaired insulin action.Central to the metabolic syndrome narrative is visceral adiposity, a predominant risk factor that amplifies the susceptibility to cardiovascular and metabolic complications. Extensive epidemiological surveys conducted in the United States, Europe, and Japan have consistently drawn attention to the co-occurrence of psoriasis and metabolic syndrome. Furthermore, emerging evidence suggests that psoriasis, beyond being merely comorbid, may independently contribute to an increased risk of cardiovascular disease.[2]Psoriasis patients often exhibit a clustering of risk factors for cardiovascular events, including higher rates of smoking, obesity, physical inactivity, and psychological stress. These factors collectively underscore the need for a comprehensive understanding of the intricate relationship between psoriasis and metabolic syndrome, not only for accurate clinical management but also for preventive strategies aimed at mitigating the serious complications associated with these conditions.

Psoriasis, a widespread and persistent inflammatory disorder characterized by the involvement of T cells, demands careful and specialized dermatologic attention due to its chronic nature. The condition exhibits a significant genetic component, displaying autoimmune traits and a predisposition influenced by genetic factors. Despite being a global concern, the prevalence of psoriasis varies across different regions, with higher incidence rates reported in Scandinavians and Caucasians and comparatively lower rates among Africans and Asians. Research findings have documented a broad spectrum of prevalence, ranging from as low as 0.84% to as high as 5.6%, underscoring the variability in its global impact.Clinical presentations of psoriasis are distinctive, featuring scaly, red, and indurated plaques that are sharply demarcated, typically affecting the

scalp and extensor surfaces initially. The disease's complexity is further emphasized by a multifaceted genetic landscape, involving inflammatory processes and the hyperproliferation of keratinocytes orchestrated by T-cells.[3] This intricate interplay of genetic and immunologic factors contributes to the diverse manifestations observed in individuals with psoriasis.While the mortality rate associated with psoriasis is generally low, the condition carries a substantial burden of morbidity. Even with minimal involvement of the body surface area, psoriasis can significantly impact the quality of life for affected individuals. Beyond its physical manifestations, the disease's psychosocial implications highlight the need for a holistic approach to care. Comprehensive management strategies should address not only the visible symptoms but also consider the psychological and emotional well-being of individuals, recognizing the broader impact of psoriasis on their overall health and daily lives. This understanding is crucial for tailoring effective interventions that enhance both the dermatological and psychosocial aspects of living with psoriasis.

The prevailing notion has been that the majority of infiltrating T cells in psoriasis belong to the T-helper cell (Th)1 subset, producing interferon (IFN)-gamma and tumor necrosis factor (TNF)-alpha.[4] However, recent insights have shed light on the critical role of aberrantly activated dendritic cells in the skin, unveiling a new dimension in the pathogenesis of psoriasis.These activated dendritic cells exert a profound influence on Th17 cells, triggering the production of interleukin (IL)-17 and IL-22. Notably, IL-22 induces the proliferation of keratinocytes, contributing to the characteristic features of psoriasis, such as scaly plaques and hyperproliferation of the epidermis. This discovery adds complexity to our understanding of the immunological processes underlying this chronic inflammatory skin disorder.Psoriasis, beyond its localized manifestations, exhibits systemic involvement, impacting joints in some patients.[5] The systemic inflammation observed in psoriasis patients is linked to various adipocytokines, including TNF-alpha, adiponectin, leptin, and plasminogen activator inhibitor-1 (PAI-1). Among these, TNF-alpha emerges as a pivotal player, playing a central role not only in the pathogenesis of psoriasis but also in the context of metabolic syndrome.The intricate interplay between inflammatory cytokines, particularly TNF-alpha, underscores the interconnectedness of psoriasis and metabolic syndrome. Understanding these molecular relationships opens avenues for targeted therapeutic interventions that may simultaneously address the dermatologic and metabolic aspects of these conditions. This evolving comprehension of the immunological and systemic underpinnings of psoriasis enhances our ability to devise comprehensive strategies for managing both the cutaneous and systemic manifestations of this complex disorder.

The established association of psoriasis with various components of metabolic syndrome, such as diabetes, obesity, hypertension, and dyslipidemia, has paved the way for an expanded understanding of the interconnections between these conditions.[6] More recently, psoriasis has been linked not only to the traditional metabolic components but also to the atherosclerotic aspect of metabolic syndrome.The skin affected by psoriasis exhibits a distinctive expression of inflammatory mediators, including TNFα, IL-1, IL-6, and IL-8, believed to be primarily induced by IL-17. Interestingly, IL-17 is also found in individuals experiencing acute myocardial infarction and angina, accompanied by elevated levels of C-reactive protein, IL-6, and IL-8. The shared occurrence of these inflammatory mediators in both psoriasis and cardiovascular diseases suggests a potential common pathway linking these seemingly disparate conditions.Furthermore, metabolic syndrome is prevalent in a significant percentage, ranging from 30% to 50%, of individuals with psoriasis, exerting a comprehensive impact on their overall health. The current clinical trial was undertaken with the objective of systematically assessing the association between psoriasis and metabolic syndrome. Additionally, the study aimed to evaluate the disease activity and duration in psoriatic patients, comparing those with and without metabolic syndrome.This research endeavors to unravel the intricate web of connections between psoriasis and metabolic syndrome, shedding light on the shared inflammatory pathways and their implications for the overall health and well-being of individuals with psoriasis. The findings from this clinical trial are poised to contribute valuable insights that may guide more targeted and comprehensive approaches to managing these interconnected health conditions.[7,8]

MATERIALS AND METHODS

The objective of the current clinical trial was to systematically investigate the association between psoriasis and metabolic syndrome, concurrently evaluating the disease activity and duration in psoriatic patients, with a specific focus on those with and without metabolic syndrome. The study population consisted of patients with psoriasis attending the outpatient department of Dermatology, and rigorous ethical considerations were adhered to throughout the research process.

To ensure the ethical integrity of the study, clearance was obtained from the Institutional Ethical Forum, underscoring the commitment to safeguarding the rights and well-being of the participants. Following the necessary approvals from the ethical committee, a comprehensive screening process was initiated among all patients .The diagnosis of psoriasis was established through clinical examination, and in cases where

uncertainty persisted, histopathological examination was employed to confirm the diagnosis.

All individuals diagnosed with psoriasis were invited to participate in the study after providing informed consent. This careful and ethical approach aimed to foster transparency, uphold the principles of patient autonomy, and ensure the scientific rigor of the investigation. The study design and enrollment process were guided by a commitment to ethical standards, ensuring the reliability and credibility of the findings derived from this exploration of the intricate relationship between psoriasis, metabolic syndrome, and associated clinical parameters.

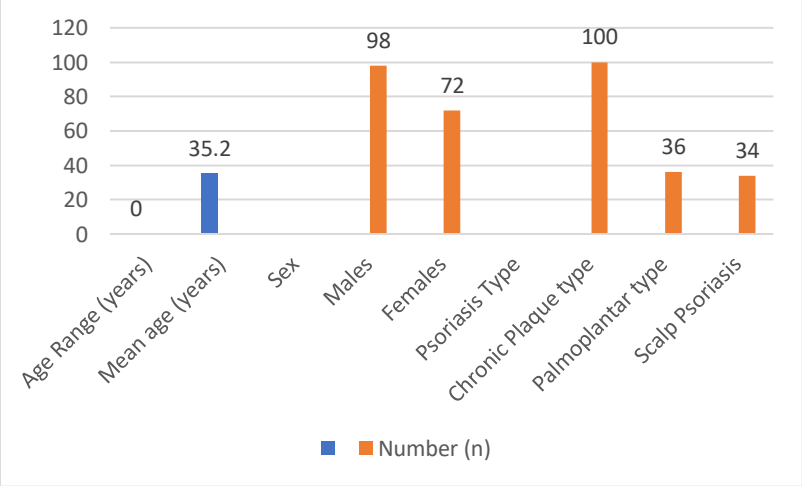
In the meticulous execution of this study, a total of 170 participants were carefully chosen based on well-defined inclusion criteria. Those eligible for inclusion were individuals with a clear and definitive diagnosis of psoriasis, presenting without other systemic diseases and refraining from concurrent medication. The study further required participants to willingly provide their informed consent, emphasizing the importance of ethical considerations. Additionally, the study focused on individuals aged 18 years or older to ensure a representative adult population.Conversely, certain exclusion criteria were implemented to maintain the specificity of the study cohort. Pregnant and lactating females, minors, and individuals undergoing systemic medication, including Methotrexate, Acitretin, Apremilast, and Cyclosporin within the past month, were excluded from the study. This meticulous selection process aimed to establish a cohort that would effectively contribute to the exploration of the association between psoriasis and metabolic syndrome.Upon enrollment, a comprehensive set of clinical parameters was systematically recorded for each participant. This included an analysis of serum cholesterol levels, with a specific focus on high-density lipoprotein (HDL) and triglycerides. Blood pressure and blood glucose levels were also measured, providing a holistic overview of the participants' metabolic health. To supplement the physiological assessments, an extensive history-taking process was undertaken. This involved documenting demographic information, medical history, drug history, personal habits, and a thorough family medical history. Furthermore, waist circumference measurements were collected, adding an anthropometric dimension to the comprehensive dataset.The judicious application of inclusion and exclusion criteria, coupled with the thorough collection of clinical and demographic data, laid the groundwork for a robust and insightful investigation. This multifaceted approach aimed to uncover the nuanced relationship between psoriasis and metabolic syndrome, while also providing valuable insights into the disease activity and duration among the study participants.

RESULTS

Table 1: Demographic Characteristics of the study subjects

Characteristic		Number (n)
Age Range (years)	20-70	
Mean age (years)	35.2	
Sex		
Males		98
Females		72
Psoriasis Type		
Chronic Plaque type		100
Palmoplantar type		36
Scalp Psoriasis		34

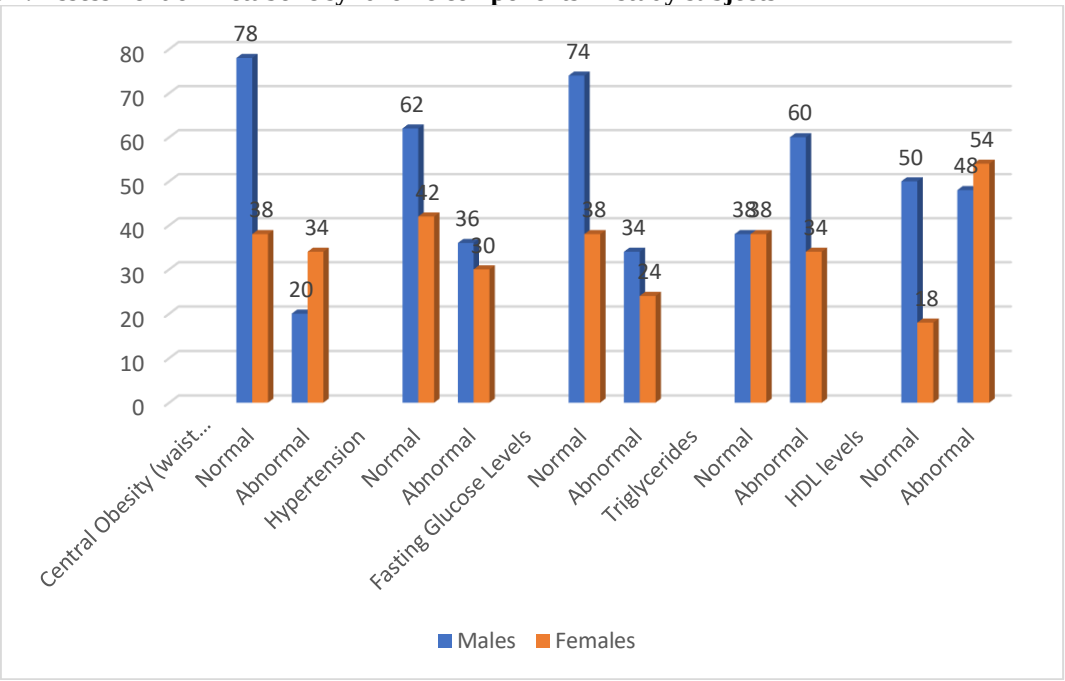
Figure 1: Demographic Characteristics of the study subjects



In the current clinical trial, a comprehensive examination was undertaken to explore the association between psoriasis and metabolic syndrome, concurrently evaluating disease activity and duration in psoriatic patients with and without metabolic syndrome. The study exhibited a diverse participant pool, encompassing both males (n=98) and females (n=72), spanning an age range from 20 to 70 years, with a mean age of 35.2 years.The inclusion of various types of psoriasis in the study contributed to a nuanced understanding of the condition. Among the observed types, chronic plaque-type psoriasis was the most prevalent, encountered in 58.88% (n=100) of the study subjects. Following this, the palmoplantar type was observed in 21.17% (n=36) of participants, and scalp psoriasis was noted in 20% (n=34) of subjects. This diversity in psoriasis types underscores the heterogeneous nature of the disease within the study cohort.Table 1 provides a detailed overview of the demographic characteristics of the study subjects, offering insights into the distribution of gender, age, and the prevalence of different psoriasis types. This comprehensive examination of participant demographics lays the groundwork for subsequent analyses, allowing for a more nuanced interpretation of the findings related to psoriasis, metabolic syndrome, disease activity, and duration. The inclusion of diverse demographics enhances the generalizability of the study's outcomes and facilitates a more comprehensive understanding of the complex interplay between psoriasis and metabolic syndrome across various patient profiles.

In the assessment of metabolic syndrome, the study employed a comprehensive evaluation of various components, including waist circumference, blood pressure, blood glucose levels, HDL levels, and triglyceride levels. The results of these assessments are succinctly summarized in Table 2. The National Cholesterol Education Program Adult Treatment Panel III (NTEP ATP III) definition was utilized, setting specific cut-off values for each parameter of metabolic syndrome. The findings revealed that 31.76% (n=54) of subjects exhibited abnormal waist circumference, with a higher prevalence observed in females (62.9%) compared to males (37.02%).Hypertension was defined by a systolic blood pressure greater than 130 mm Hg or diastolic blood pressure greater than 85 mm Hg. The study identified hypertension in 66 subjects, with a slightly higher prevalence in males (54.5%, n=34) compared to females (45.45%, n=30).Plasma glucose levels were considered abnormal when exceeding 100 mg/dl. Among the total 170 patients, 58 presented impaired glucose levels, with a higher proportion observed in females (58.6%, n=34) compared to males (41.3%, n=24).Triglyceride levels exceeding 150 mg/dl were used as the cut-off for identifying abnormal levels. The study found impaired triglyceride levels in 94 out of the total 170 patients, highlighting a significant proportion of the study population with elevated triglycerides.These detailed assessments, using established cut-offs, provide a comprehensive understanding of the prevalence of metabolic syndrome components within the study cohort. The data in Figure 2 forms a crucial foundation for further analysis regarding the association between psoriasis and metabolic syndrome, shedding light on the metabolic health of the participants in the study.

Figure 2: Assessment of Metabolic syndrome components in study subjects



DISCUSSION

The primary aim of the current clinical trial was to delve into the intricate relationship between psoriasis and metabolic syndrome, shedding light on both the prevalence of different psoriasis types and the co-occurrence of metabolic abnormalities within the study population.[9] A predominant observation was the prevalence of chronic plaque-type psoriasis, found in 58.8% (n=100) of the study subjects. This aligns with earlier research, notably the study by Neimann AL et al in 2006, which reported a high incidence (90%) of plaque-type psoriasis among patients.Within the cohort, a significant proportion, encompassing 38.82% (n=66) of patients, was identified as having metabolic syndrome. Of particular note was the gender distribution within this group, with 57.57% of affected individuals being male. Central obesity, a pivotal component of metabolic syndrome, was evident in 31.76% of patients, and within this subgroup, the majority (62.9%) were females. This observation resonates with findings from previous studies, including those conducted by Gisondi et al in 2007 and Jacob Drehier and Dahlia, highlighting a consistent association between central obesity and psoriasis across diverse study cohorts.

Examining individual components of metabolic syndrome, impaired fasting glucose (IFG) affected 34.1% of patients, with a notable gender difference – 58.6% of affected individuals were females. Hypertension, another significant metabolic parameter, was present in 38.82% of patients, with a slightly higher representation of males (54.5%) in this subset.[10]These nuanced findings illuminate the complex interplay between psoriasis and metabolic syndrome, unveiling distinct patterns in the prevalence of psoriasis subtypes and the manifestation of metabolic abnormalities. This exploration not only adds depth to our understanding of the systemic implications of psoriasis but also provides valuable insights that could inform targeted therapeutic approaches for individuals grappling with both psoriasis and metabolic syndrome. The comprehensive nature of the study, encompassing demographic, clinical, and metabolic parameters, lays a robust foundation for future investigations and interventions aimed at optimizing the management of these interconnected health conditions.

The investigation led by Johnston et al. provided valuable insights into the relationship between body mass index (BMI), waist circumference, and serum leptin levels.[11] Their findings highlighted a positive correlation, indicating that as BMI and waist circumference increased, so did the levels of serum leptin. This correlation is in line with the established role of leptin as a hormone produced by adipose tissue, reflecting the body's adiposity and playing a key role in regulating energy balance.However, when examining leptin levels in the context of psoriasis, intriguing discrepancies emerged between the results of Johnston et al. and subsequent research efforts, including our own investigations and those conducted by other research groups. Contrary to Johnston et al.'s observations, our studies, along with others, revealed heightened leptin levels in individuals with psoriasis when compared to both patients with other skin diseases and matched healthy controls.This discrepancy prompts a critical examination of the multifaceted relationship between psoriasis and metabolic factors, particularly the role of leptin. Leptin, traditionally associated with adipose tissue and energy regulation, appears to exhibit distinct patterns in individuals with psoriasis. The increased levels of leptin observed in psoriatic individuals suggest that there may be specific metabolic and inflammatory mechanisms at play, potentially influencing the production and regulation of this hormone in the context of psoriasis.[12]As research in this area continues to unfold, it becomes apparent that the relationship between metabolic markers, such as leptin, and dermatological conditions like psoriasis is intricate and warrants comprehensive exploration. The observed variations in study outcomes emphasize the necessity of considering multiple studies and perspectives to build a nuanced and holistic understanding of the connections between metabolic factors and inflammatory skin disorders. Further research is crucial to unveil the underlying mechanisms driving these variations and to delineate the implications for the overall health of individuals with psoriasis.

The study's comprehensive examination of lipid profiles revealed impaired triglyceride levels in a significant portion, affecting 55.29% (94 out of 170) of the total psoriatic patient cohort, with a higher prevalence observed in males at 63.8%. These findings resonate with earlier investigations conducted by Shapiro J et al, Cohen et al, and Barclay L. The consistent identification of metabolic abnormalities, particularly concerning dyslipidemia, underscores the intricate relationship between psoriasis and systemic metabolic factors.An intriguing aspect of the study was the exploration of the duration of psoriasis among participants. A substantial proportion, accounting for 39.4% of patients, reported a psoriasis duration exceeding 70 months.[13] The study revealed a compelling trend: an increasing occurrence of metabolic syndrome with prolonged psoriasis duration. This temporal correlation aligns with research by Gisondi et al, which highlighted that psoriatic patients with metabolic syndrome tended to exhibit longer durations of psoriasis and were generally older than their counterparts without metabolic syndrome. This temporal dimension emphasizes the potential cumulative impact of psoriasis on metabolic health over an extended period.Notably, 66 out of the 170 psoriatic patients in the study were diagnosed with metabolic syndrome. This concurs with the findings of Isabela Guimarães Ribeiro Baeta et al, where nearly 45% of patients met the criteria for a diagnosis of metabolic syndrome.

The consistency in these observations across studies reinforces the robust link between psoriasis and metabolic syndrome, pointing to shared pathophysiological mechanisms.These multifaceted findings underscore the importance of adopting a holistic approach to managing psoriasis, recognizing its systemic implications.[14] The intricate interplay between psoriasis and metabolic factors necessitates ongoing research to unveil underlying mechanisms and inform targeted interventions. The cumulative evidence from diverse studies contributes to a more comprehensive understanding of the complex relationship between psoriasis and metabolic health, paving the way for integrated healthcare strategies that address both the dermatological and metabolic aspects of this multifaceted condition.

The concept of the "psoriatic march," as proposed by Boehncke et al., introduces a sequential progression whereby psoriasis is implicated in causing insulin resistance.[15] This insulin resistance, in turn, sets off a cascade of events leading to endothelial cell dysfunction, the development of atherosclerosis, and ultimately culminating in conditions such as myocardial infarction or stroke. This proposed sequence sheds light on the systemic impact of psoriasis, extending beyond the skin to involve metabolic and cardiovascular aspects.Research findings from studies on rheumatoid arthritis and psoriatic arthritis have provided valuable insights into the potential benefits of anti-tumor necrosis factor-alpha (anti-TNF-α) treatments.[16] These treatments demonstrated an anti-proatherogenic effect, with documented reductions in low-density lipoprotein (LDL) and triglyceride levels. Such observations suggest a promising avenue for managing not only the joint manifestations of these conditions but also their cardiovascular implications.Moreover, studies conducted by Bernstein et al. reported positive outcomes with etanercept treatment in the context of metabolic syndrome. After just four weeks of treatment, etanercept was associated with a significant decrease in inflammatory markers such as C-reactive protein, as well as prothrombotic factors like fibrinogen. These findings underscore the potential of targeted anti-inflammatory therapies in mitigating the adverse effects of metabolic syndrome.In the realm of rheumatoid arthritis, research by Jacobsson et al. highlighted a significant suppression of cardiovascular disease (CVD) when treated with anti-TNF-α therapies.[17] This observation suggests a broader cardiovascular protective effect associated with these treatments, extending beyond their primary anti-inflammatory actions.These collective findings contribute to a growing body of evidence supporting the notion that interventions targeting the inflammatory pathways in psoriasis and related conditions may hold promise in not only managing the skin manifestations but also addressing the systemic implications, particularly in the context of cardiovascular health. The evolving understanding of the "psoriatic march" opens avenues for further research and the development of targeted therapeutic strategies to mitigate the broader impact of psoriasis on metabolic and cardiovascular health.

CONCLUSION

The present study draws a significant conclusion regarding the association between psoriasis and metabolic syndrome. Notably, it identifies fasting levels of serum triglycerides and HDL cholesterol as commonly deranged parameters within metabolic syndrome in individuals with psoriasis. Additionally, fasting glucose levels, followed by central obesity, are identified as commonly impaired components in females with psoriasis. The extent of body surface area involvement in psoriasis demonstrates an association with the presence of metabolic syndrome. Furthermore, the study highlights an increasing trend in the occurrence of metabolic disease with a longer duration of psoriasis, suggesting a potential cumulative impact.However, it's crucial to acknowledge the study's limitations, which include a smaller sample size, a relatively short monitoring period, a cross-sectional design, single-institutional involvement, and potential biases related to geographical location. These limitations emphasize the need for caution in generalizing the findings. To establish a more definitive conclusion and enhance the robustness of the study's outcomes, there is a call for more extensive and rigorous research. Longitudinal clinical trials with larger sample sizes and extended monitoring periods would contribute valuable insights into the dynamics of the relationship between psoriasis and metabolic syndrome.In essence, while the present study provides important initial insights, its limitations underscore the necessity for continued research efforts to deepen our understanding of the intricate interplay between psoriasis and metabolic health. Future studies with an expanded scope and more diverse participant cohorts are essential to validate and build upon these findings, ultimately guiding the development of effective interventions and management strategies for individuals with both psoriasis and metabolic syndrome

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