LETTER TO EDITOR OPEN ACCESS

# Metabolic Syndrome and Skin Manifestations: A Bidirectional Association

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Dear Editor,

Skin is the largest organ of the body, and serves as an outermost mechanical and chemical boundary between the internal and external environment. It also serves as the body's major source of antioxidants in response to stress and inflammation. However, that makes it vulnerable to a variable number of infectious and systemic manifestations. Where most ailments are caused by innate skin pathology, many of the cutaneous manifestations are a mirror to the internal metabolic environment. Systemic disorders such as diabetes mellitus, systemic sclerosis, bowel disease, tumors, and much more concurrently or proceeding accompany cutaneous manifestations[1].

According to much-emerging evidence, metabolic syndrome (MetS), primarily characterized by dyslipidemia, high blood pressure, obesity and insulin resistance, may also present with a variety of skin diseases. Insulin resistance and hyperinsulinemia form the primary pathophysiological mechanism of MetS involved in the disruption of skin physiology[2]. Under healthy conditions, insulin regulates the equilibrium between proliferation and differentiation of keratinocytes and fibroblasts, a prerequisite for the formation of the epidermal structure. It has been evaluated that impaired expression of cell cycle molecules and keratins is caused by disruptions in insulin signaling. In insulin resistance, high levels of circulating insulin not only bind with its classic receptor but also with the IGF-1 receptor in the skin. This results in increased cellular proliferation of keratinocytes and fibroblasts. This forms the underlying pathophysiology of various skin manifestations such as acanthosis nigricans, acne vulgaris, hidradenitis suppurativa, androgenetic alopecia and atopic dermatitis[3]. In another study, patients with diagnosed psoriasis have been reported to have an increased risk of coronary artery diseases as a result of underlying MetS[4]. Elevated blood pressure, diagnostic criteria for MetS, has also been found to be associated with an increased risk of malignant melanoma and non-melanoma skin cancer[5].

Interestingly, some studies have linked a few skin pathologies as the causative agents for the development of MetS. Pro-inflammatory markers such as tumor necrosis factor (TNF) and interleukins (IL-6, IL-1, IL-22) produced in certain skin diseases, escape into the bloodstream and provoke insulin resistance, oxidative stress and hypercoagulation. If present for a chronic period, this subsequently leads to the development of MetS[6].

With the increasing acceptance of urban diet and lifestyle, MetS has grown to be a major health hazard over the past few decades. It is a major culprit behind coronary diseases, hypertensive stroke accidents and other morbidities, costing a huge worldwide economic burden on the healthcare sector. Until a definite cure is found, other than preventive lifestyle and dietary habits, it is the need of the hour to look out for the possible acquisition of MetS. As skin conditions are an early indicator of metabolic disorders, a proposition is made through this letter to clinically track patients presenting with recurrent dermatological complaints. A proper history and hospital records need to be maintained to manage such suspected patients. Affected patients should be advised to keep track of their blood glucose and pressure to follow a healthy lifestyle to prevent the lethal consequences of MetS.

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**CONFLICT OF INTEREST**
The authors declare no conflict of interest.

**AUTHORS' CONTRIBUTION**
MA had given the conception of idea, performed the literature search, manuscript drafting and reviewing. MQ and AR also contributed in literature search and manuscript drafting.

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