

Review Article

A New Postulate on Two Stages of Dandruff: A Clinical Perspective

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ABSTRACT

Dandruff (pityriasis capitis, seborrheic dermatitis confined to the scalp) is a disease that has been around for centuries despite several treatment options. Almost every day new players are entering the market with various antidandruff products, perhaps due to an increase in the incidence of dandruff all over the world. Interestingly, clinicians, especially dermatologists, gave little attention to this problem. At the end, the dandruff sufferer is puzzled by the array of antidandruff products with varied claims entering the market day by day. Why have we not achieved complete treatment success against dandruff? Is dandruff a disease or disorder? It seems that our understanding about dandruff perfectly fits into the famous saying of Albert Einstein, "as the area of light increases, so does the circumferences of darkness." Have dermatologists left dandruff unattended, only to be exploited by the personal care industry?

Key words: Dandruff, malassezia, pityriasis, scalp disorder

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WHAT IS DANDRUFF?

Dandruff (pityriasis capitis, seborrheic dermatitis confined to the scalp) is a disease that has been around for centuries despite several treatment options.^[1] Dandruff should not be defined only by its clinical presentation, pathophysiology and/or its etiological spectrum. The definition needs to include its impact on society as well. The scaly scalp may look unhygienic and untidy. It could make the sufferer feel self-conscious and embarrassed. Dandruff affects the self-esteem and confidence.^[2] Itching due to dandruff also causes great embarrassment to the sufferer in public. Dandruff causes more social and psychological problems than medical ones. The personal care industry conveniently offers its range of products targeting the psychological aspects of dandruff through carefully planned advertisements and through various products for dandruff. Dandruff is often defined as increased scaling of the scalp, representing the more active end of physiological desquamation.^[3] Why does such physiological/clinical presentation occur? The postulate of fatty acid metabolism by the commensal lipophilic yeast of scalp skin – Malassezia – is losing its charm as, in many cases, scaling occurs without the organism being present. The issue is what triggers the rapid scaling and what maintains the state in continuum? What

should be the approach to treatment? Treating the clinical signs and symptoms or eliminating the cause? Dandruff may be a primary disorder in the series of physiological scaling – dandruff, seborrheic dermatitis, psoriasis – and the condition is worsened by the commensal flora, Malassezia. We believe that the commensal organism becomes a saprophyte when abundant food and substrate is available.

Should we accept dandruff as part of our normal physiology? It is very interesting to note that dandruff and pityriasis versicolor are believed to be caused by the same organism.^[4] However, many dandruff sufferers seldom have pityriasis versicolor and vice versa. Is it strain variability that accounts for skin disease and scalp involvement separately? Or, does local immunity play a role in the disease predisposition? Many questions are yet to be answered. Interestingly, several treatment options for dandruff are available.

PREVALENCE AND INCIDENCE OF DANDRUFF

Several studies on the prevalence of dandruff across the world have shown a prevalence of dandruff of up to 50% in the general population.^[5] The prevalence may

be increasing sharply with rapid urbanization. On the contrary, the prevalence of pityriasis versicolor is only 2–8%.^[6] One survey in the USA has shown that about 50 million people suffer from dandruff, and that nearly \$300 million is spent on various dandruff treatment products annually.

A correlation between dandruff prevalence vs. poor hygiene, overcrowding and literacy rates has been reported.^[7] It is known that poor personal hygiene facilitates many diseases. But, how is overcrowding when the disease is non-communicable? Most of the fungal infections in general, and dandruff in particular, do not spread from one person to others in a community.^[2] Our understanding is lacking in connecting to the above factors with dandruff prevalence. People with a high rate of literacy are expected to seek immediate medical attention and hence the prevalence of dandruff is expected to be relatively low in the educated population.

We disagree with the above hypothesis and findings as most literate people take self-medication as the first option in this country and try various preparations that are easily available for dandruff treatment, which sometimes makes the condition worse or resistant to future treatment. Another interesting facet is that these literate groups continuously depend on such products and constantly irritate the scalp, making the dandruff a “perennial problem” of the scalp microcosm. Hence, what is known about dandruff is only the tip of the iceberg. We propose that because of the limited importance given to dandruff in particular and fungal infections in general by the dermatologists, the sufferers largely lean to self-medication with various hair care products and antidandruff preparations. A vulnerable/sensitive scalp is perhaps the first predisposing factor for dandruff. When such a sensitive scalp is exposed to an array of products, the vulnerability can be expected to increase thus giving a much distorted picture of dandruff. Literacy, the advent of various hair care products introduced by personal care industries and relatively less importance given to dandruff by dermatologists has caused it to become a significant problem, a problem to the sufferer as well as the treating physician.

As far as sex incidence of dandruff is concerned, male population is found to be more susceptible than female population.^[8] There are two views on this male preponderance.

1. The female population is relatively more conservative in using a wide range of products on the hair and scalp. This makes it possible that treatment response may be better in the female population or dandruff may

be self-limiting with time in the females.

2. Because of the dense scalp coverage by hair, the clear picture of dandruff may not be known/visible and hence the incidence of dandruff in the female population appears to be/reported to be less.

On the contrary, short hair and due to the adventurous nature of testing various products on the scalp, the problem of dandruff may be well pronounced in males. Because of constant abuse of the scalp with various products, dandruff does not seem to be self-limiting in this sex group.

One could suggest a role for androgens in dandruff and thus explain the higher incidence of dandruff in males than in females. But then, bald people are not affected by dandruff. This would mean that the hair follicle is necessary for fungal colonization in patients with dandruff. The studies of Pierard *et al*,^[9] have shown that dandruff can cause increase shedding of hair. The *Malassezia* organism would not want this increased hair shedding to happen as that would be detrimental to its ability to sustain itself on the scalp. Therefore, we believe that *Malassezia* colonization is a secondary event in dandruff.

The prevalence rate of dandruff is almost equal in pubertal and in older age groups. It is well known that androgens stimulate sebaceous gland activity. It may be possible that sebum plays a role in dandruff rather than the hormone. If hormone imbalance were the case, females during menstrual cycle undergo hormonal changes but seldom show worsening of dandruff, whereas worsening or occurrence of acne form eruptions is quite common during the menstrual period.

In the case of dermatophytosis and candidiasis, the role of hormones are well known.^[10] Studies have shown that testosterone stimulates the growth of certain dermatophytes, while estrogen inhibits the same.^[11] The *in vitro* findings also correlate clinically with an increased incidence of dermatophytosis in the male population. The females who suffer from *Tinea corporis* in the waist region in saree wearers in India are mostly those who have attained menopause.^[12] Interestingly, estrogen promotes the growth of *Candida* species while testosterone inhibits the same, and the above study findings perfectly correlate with the sex incidence of candidiasis.^[13] Whether hormonal association in dandruff is a mere coincidence or cause is yet to be established.

An ABO blood group predisposition in dandruff has been reported.^[14] That study has also shown that a large number of people screened in the study were carriers of *Malassezia*

species, but only a very small group had dandruff. This clearly establishes the fact that the commensal *Malassezia* becomes saprophytic in some individuals in the population. The metabolites of abundantly multiplying *Malassezia* could be a cause for discomfort in dandruff. It is also possible that a sub-population of dandruff sufferers without *Malassezia* involvement exists. If some predisposing factors facilitate dandruff, why do frequent remissions and recurrences occur in dandruff sufferers at different points of time. All these studies clearly suggest that a cascade of events preclude dandruff formation and therefore to single out any one factor as the main or only cause for dandruff is very difficult.

ETIOLOGICAL SPECTRUM OF DANDRUFF

When we discuss about dandruff and its etiology, we should highlight all the known/reported causes of dandruff. The triggering factors are both microbial and non-microbial. Among the several known causes, whether any single cause or combination of many causes and, if so, in what combination, contribute to dandruff formation is very difficult to define.

Sun exposure is reported to trigger dandruff.^[5] Interestingly, sun rays are also reported to kill *Malassezia*.^[15] When we see such conflicting reports, is dandruff separate from *Malassezia*? Always, abundant cells of *Malassezia* have been seen with abundant scaling during dandruff. Whether the abundant scaling facilitates the yeast cells or increased yeast cells triggers increased scaling is difficult to answer.

The other aspect that is implicated to cause dandruff is a dry scalp.^[16] Once again, it is interesting to note that seborrheic skin is known to facilitate dandruff and pityriasis versicolor as *Malassezia* is a true lipophilic fungi. How does the dry skin of the scalp predispose dandruff by *Malassezia* is not clearly understood. The studies of Harding *et al.*^[17] have clearly shown that decrease in ceramide 1 in the stratum corneum and increase in ceramide 6i and 6ii facilitate dandruff. An impaired barrier effect and intracellular lipid levels in scalp stratum corneum and increased dandruff occurrence have been reported. The other non-specific causes for dandruff are frequent combing and overshampooing.^[5] Both frequent combing and overshampooing are known to cause scalp stratum corneum barrier impairment and, thus, there is some merit in this explanation. On an intact skin, no organism can establish its adhesion. But, this fails to explain how a commensal flora has not adapted to adhere on the scalp despite its well-established anthropophization.

The question is, has the species of *Malassezia* established anthropophization at all? From a mycology point of view, *Malassezia* is the only fungi that can exist in multiple morphological forms even during parasitism. It appears as a yeast form, mycelial form and or both. When it infects the skin, especially in chronic tinea versicolor, the mycelial form predominates and, while in dandruff, the yeast form is the most common. The varied morphological forms exhibited by the organism indicate the possible incomplete evolution as far as anthropophization is concerned. Or, in other words, multiple triggering factors might be facilitating the organism to become saprophytic from its commensal status. We strongly believe that *Malassezia* shift from commensal status to saprophytic status when abundant scaling is available and there is no parasitic stage for this organism.

Based on the current knowledge about dandruff, we propose to divide dandruff into two distinct stages, viz.

- a) Primary stage
 1. Multiple host-specific predisposing factors
 2. Multiple triggering factors of a non-specific nature/non-microbial origin
- b) Secondary stage
 1. Multiple microbial etiology
 2. Varied individual-specific response pattern

Treating dandruff requires a rational approach and understanding, and should be tailored to each patient. Fungal etiology needs to be confirmed before use of any antifungal line of therapy. The disease needs to be confirmed as primary or secondary so as to decide the specific line of treatment. Dermatologists must give high priority in treating dandruff as otherwise an unknown "Tertiary" stage of disease might occur in the future that may pose a greater challenge to the medical fraternity.

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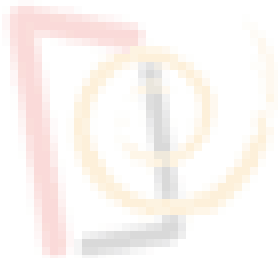
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