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**Original Article**

# Frequency of hair loss in lesions of pityriasis versicolor

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## Abstract

***Objective*** To determine the frequency of hair loss in the lesions of pityriasis versicolor.

***Methods*** It was a cross-sectional study carried out at the outpatient department of dermatology, Fauji Foundation Hospital, Rawalpindi, Pakistan over six months period after approval from the hospital's ethical committee. Informed consent was obtained from participants. Two punch biopsies were taken from each patient, one from lesional and other from nonlesional skin under local anesthesia. The biopsy specimen included at least one hair or follicular ostium. Biopsy specimens were observed histopathologically for evidence of hair loss by making a comparison of lesional specimen with the nonlesional specimen. Frequency of hair loss was also documented.

***Results*** Histopathological evaluation of biopsy specimens from the lesions of pityriasis versicolor demonstrated hair loss in a significant number of patients (57.6%) when compared to biopsy specimens from nonlesional skin.

***Conclusion*** Pityriasis versicolor can cause hair loss in a significant number of individuals.

***Key words***
Hair loss, pityriasis versicolor.

## Introduction

Pityriasis versicolor (PV) is a superficial fungal infection of skin, caused by genus *Malassezia*.[1] *M. globosa*, *M. furfur* and *M. sympodialis* are the predominant species isolated in the Indian subcontinent.[2]

Infection depends upon factors including climate, occupation and socioeconomic conditions. Hot and humid environment favours its growth. Males and females are equally affected. Increased incidence is reported in Cushing disease, immunosuppression and malnourishment.[3-5]

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The typical lesion is a sharply demarcated macule with branny scaling commonly found on upper trunk, followed by arms, neck and abdomen. Face and scalp are also affected.[6]

It presents a considerable disease burden in Pakistan due to its favourable climate. In a study conducted at Lahore, frequency of fungal infections was 12.5% amongst geriatric population.[7]

It is a dimorphic fungus, existing in its yeast form as a normal commensal of human body, transforming to pathological mycelial state in favourable circumstances.[8] In approximately 20% of cases, a familial predisposition is found.[9]

Diagnosis can generally be made clinically and confirmed by the golden yellow fluorescence of

lesions on Wood's light examination. Affected specimens consist mainly of hyphae with clusters of spherical yeasts, well recognized as 'the spaghetti and meatball appearance on KOH mounted skin scrappings.[10-12]

Previously, it was thought that hair shaft is not affected in PV.[13] Hair loss was never documented until recently. A study conducted by Mostafa *et al*.[14] described hair loss in the lesions of PV. In this study, hair loss/ thinning was observed clinically in 61.5% of the patients, while histopathologically, it was shown in 46.2% of lesional and 20.5% of nonlesional skin.[14]

*Malassezia* may induce pathological changes in hair follicles either by direct toxicity or through production of various cytokines inducing apoptosis, as a part of keratinocytes response to presence of fungus. Keratinocytes produce a range of proinflammatory and immunoregulatory cytokines, which might favor induction of immune response and lymphocyte proliferation as well as pathological changes in hair follicles.[15]

The clinical finding of hair loss supported by histopathological evidence opens up a new perspective of the disease, as the condition now merits a serious consideration, amongst others, when a patient presents to a dermatologist for hair loss. Also, the impact of cosmetic disfigurement will be much greater when the disease presents on scalp, face or beard area with hair loss also as part of the disease. This implies that a common practice of short-term topical treatment may need to be reviewed, a follow-up for recurrence and chronicity of the disease may be advised and a systemic or prolonged course of the treatment, as well as, prophylaxis in cases of recurrent disease may be planned.

## Methods

It was a cross-sectional study done over six months period starting from September, 2014 to March, 2015 carried out at the department of Dermatology, Fauji Foundation Hospital, Rawalpindi, Pakistan. Nonprobability consecutive sampling was done. Using WHO sample size calculator with confidence interval 95%, anticipated population proportion 46.2%, absolute precision regained 10%, sample size of 125 patients was calculated. Permission for this study was obtained from Hospital Ethical Committee.

Patients of either sex having PV clinically, between 10 to 50 years old, not on topical or systemic treatment for PV for the past 4 weeks were included. Patients having systemic illnesses associated with hair loss like postpartum hair loss, thyroid disease and medical therapy known to cause hair loss like drugs and radiations were excluded. Patients were free to withdraw from the study at any point during the study.

Patients fulfilling the stated criteria were recruited after informed consent through dermatology OPD Fauji Foundation Hospital. Patients with clinical suspicion of PV were examined under Wood's light for fluorescence. Two punch biopsies were taken from each patient, one from the lesional and other from the nonlesional skin under local anesthesia. Biopsies included at least one hair follicle or follicular ostium. The punch biopsies, as well as, their histopathological examination was done free of cost by Fauji Foundation Hospital dermatology department and pathology department, respectively.

Hair follicles in the affected skin were compared with the follicles in the unaffected skin. Evidence of atrophy was seen as "shrunken" or

"fading follicles", when compared to the overall size of dermis and other cutaneous adnexa and to the follicles of the nonlesional skin. Miniaturized follicles were identified microscopically by decreased dermal papilla size, decrease in hair matrix and hair shaft diameter.

Data was entered and analyzed in SPSS version 10.0. Categorical variables like hair loss, site of lesions were described in terms of frequencies and percentages while mean with or without standard deviation was computed for quantitative variables like age and duration of symptoms. Effect modifiers like age, gender, duration and site of lesion were controlled by stratification. Poststratification chi-square test was applied. *P* value of <0.05 was considered significant.

**Results**

125 patients were included in the study. Patients were of different ages. Mean age of the sample (years) was 20.98±9.05. Minimum and maximum age was 11 and 52 years, respectively. Majority of the study population was female i.e. 64%, while 36% were males.

Patients had a history of lesions from minimum of one month duration to a maximum of two years. Mean duration of lesions (months) was 3.78±1.87.

Out of 125 patients, maximum patients i.e. 34 (27.2%) had lesions on their back, similarly 23 (18.4%) patients had lesions on their chest. There were 5 (4.0%) patients who had lesions on their face.

Out of 125 patients, there were 72 (57.6%) patients who presented with hair loss within the lesions.

There were 65 (90.3%) patients less than 30 years of age having hair loss within the lesions of PV, whereas there were 7 (9.7%) patients aged more than 30 years, found to have hair loss within the lesions (*p* value 0.361).

There were 28 (38.9%) male patients who presented with hair loss within the lesions of PV, whereas 44 (61.1%) female patients had hair loss within the lesions (*p* value 0.433).

There were 71 (98.6%) patients with hair loss with the disease duration of less than a year. Whereas there was only one patient with hair loss in lesions who had the disease for more than one year (*p* value 0.389)

There were 20 (27.8%) patients who predominantly had the disease on their back, whereas there were 12 (16.7%) patients with predominant involvement of their chest (*p* value 0.671).

**Discussion**

Majority of the patients in this study were young adults. 90% of the study population were <30 years of age with a mean age of about 21 years. This is consistent with the results of other studies. This has been linked to high sebum secretion rates in young adults. Majority of the studies have found no sex predilection for the disease.[16] In this study, out of 125 patients, 45 (36%) were males and 80 (64%) were females, apparently suggesting a female predisposition for the disease. However, the study comprises predominantly of female patients because Fauji Foundation Hospital offers entitlement to specified ex-service men and their families and young male adults above 18 years are not entitled for treatment.

He *et al*.[17] in their study found both males and females to be affected by the disease and that for

both male and female patients, the peak age of initial onset was 20-29 years.

In our study, the predominantly involved areas of body were back (27.2%), upper chest (18.4%), neck (14.4%), arms (13.6%), which is comparable to other studies done. This is in correspondence to the density and activity of pilosebaceous glands in these body regions.[10] Involvement of face and scalp is also not very uncommon. Mostafa *et al*.[14] in their study found that in 50% of patients facial lesions were present and 60.7% had involvement of beard area. In this study, 5% of patients presented with lesions predominantly involving the face. However, no case was found presenting with localized involvement of face.

Until recently, hair loss was not considered to be a feature of PV. This is the first study done that refutes the older concept that hair loss is not a feature of PV, and has important implications.

In this study, out of a total 125 patients, 72 (57.6%) had a histopathological evidence of hair loss within the lesions when a comparison of lesional skin was made with the nonlesional skin. Mostafa *et al*.[14] found the follicular damage to be occurring in 47% of their patients' biopsy specimens.

Along with the other histopathological changes of superficial mycosis, follicular abnormalities observed on histopathology included atrophy, absent shaft, miniaturization, keratotic plugging, infundibular dilatation. One or more of these features were noted in 57.6% of the lesional compared to nonlesional biopsy specimens.

A study drawback was that in a few patients, the nonlesional biopsy specimens showed features of fungal infection and changes similar to involved skin probably due to subclinical infection, which could not be appreciated at the time of skin biopsy. In these cases, a comparison between diseased and healthy skin was not possible.

This study evaluated the effect of variables like age of patient, sex, site of lesion and duration of disease on the frequency of hair loss. None was found statistically significant (*p* value for each was >0.05). Hence, hair loss occurring in PV cannot be linked to any of these variables, and possible etiology needs to be further worked up.

It may be hypothesized that presence of hair loss in a particular individual, within the lesions of PV is related to individual's immune response, which determines the ability to induce cytokine production by human keratinocytes among *Malassezia* yeasts.

It may explain why hair loss occurs in some individuals having PV and not in others. It may also be suggested that certain *Malassezia* species, amongst all causing PV, are capable of inducing hair loss, as different *Malassezia* species have been shown to be associated with a different cytokine profile and some of the induced cytokines have been shown to inhibit follicle activity.[14,15] However, no study as yet ascertains the factors predisposing an individual to hair loss when affected by PV.

The finding of hair loss occurring within the lesions of PV has certain important implications. Firstly, it should be considered as a differential diagnosis, amongst others, in patients presenting with hair loss. This is particularly important when alopecia areata is being considered as a cause of patchy hair loss, as many a time topical or intralesional steroid treatment is started without obtaining a skin biopsy for histopathological diagnosis of alopecia areata. In this case, if PV was the underlying pathology, the immunosuppressive effect of steroids may

lead to extensive disease and aggravation of hair loss.

Another important implication of this novel finding is to make Wood's lamp examination an essential part of clinical examination in a patient presenting with patchy hair loss. A regular practice of Wood's lamp examination may prove useful, as the infection may be subclinical and not associated with pigmentary changes of skin, which is the usual presentation of PV.

Thirdly, a greater cosmetic disfigurement is associated with PV due to the presence of hair loss in addition to pigmentary changes in skin colour, particularly in cases involving scalp and face, especially the beard area in men.[14]

This may also have a particular impact on common practice of short-term topical antifungal treatment of PV, as systemic therapy may be needed or a prolonged treatment course may be devised.

Fourthly, in cases of frequent recurrences, prophylaxis may be advised and patients with chronic infection may be called for regular follow up to check treatment response and to prevent the development of alopecia.

Fifthly, additional studies need to be performed to further explore this aspect of the disease such as mycological cultures and PCR to identify the specific *Malassezia* species that can cause hair loss. The immunohistochemical identification of the role of various cytokines influencing hair growth also needs to be explored.

## Conclusion

Hair loss occurs in a significant number of cases of pityriasis versicolor, which is a novel aspect of the disease. In view of diagnostic accuracy in cases of nonscarring, patchy hair loss and the cosmetic disfigurement associated with hair loss, further studies are required to explore the etiology and pathogenesis of this phenomenon and a revision of treatment guidelines is required to ensure that follicular damage associated with this disease is appropriately taken care of.

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