Original Research
Medical Journal of the Islamic Republic of Iran. Vol. 21, No.1, May 2007. pp. 11-16

Psoriasis and infestation with Malassezia

Z. Javidi MD.[1], M. Maleki MD.[2], A. Fata, PhD.[3], Y. Nahidi MD.[4], H. Esmaeili, PhD.[5], and AR. Hosseini, MD.[6]

Department of Dermatology, Imam Reza Medical Center, Mashhad University of Medical Sciences, Mashhad, Iran

Abstract

Background: Psoriasis is a chronic proliferative condition of the skin. Its accurate pathogenesis has not been known yet, but interactions between genes and environmental factors have been implicated in its initiation. The role of malassezia in psoriasis is still undetermined, but several reports have associated these lipophilic yeasts with the development of skin lesions in psoriasis.Our aim was to investigate the correlation between malassezia and psoriasis.

Methods: In this case control study over a 6 month period skin samples were obtained from lesions of 50 psoriatic and 50 healthy volunteers to evaluate malassezia infestation. Obtained data were collected by questionnaires and analyzed by SPSS software and applying statistical tests of χ^2 and Mann-Whitney.

Results: There was no difference between malassezia infestation in scalp lesions of psoriatic and control cases (P=0.86). Malassezia infestation in psoriatic patients with scalp involvement was more than those without it, but it was not a significant relationship (P=0.069). There was an inverse significant correlation between scalp infestation with malassezia and chronicity of psoriasis (P=0.04). This infestation in trunk skin of patients was less than normal individuals (P<0.000).

Conclusion: There seems to be an initiating role in inducing immune mechanisms involved in the pathogenesis of scalp psoriasis by malassezia, but with chronicity and formation of dry and hyperkeratotic plaques, the environment will be inappropriate for malassezia, so malassezia infestation decreases with chronicity of disease.

Keywords: psoriasis, malassezia , etiology.

Introduction

Psoriasis is a chronic proliferative disease with a reported 0.3-4.8% prevalence in different resources. Its etiology is still undetermined, but interfering genetic and environmental factors in its pathogenesis are known to be substantial [1]. One of the considered environmental factors is infestation with malassezia yeast. Malassezia's role in psoriasis is still not determined, yet several studies have considered these lipophilic yeasts to be related with psoriatic skin lesions [2,3].

The cases most commonly associated with the yeasts are those that tend to involve the

1. **Corresponding author**, Associate Professor, Department of Dermatology, Imam-Reza Medical Center, Mashhad University of Medical Sciences, Mashhad, Iran. Tel: +98 915 5137943, email: zari_javidi@yahoo.com
2. Associate Professor, Department of Dermatology, Imam-Reza Medical Center, Mashhad University of Medical Sciences, Mashhad, Iran.
3. Full Professor, Department of Laboratory Sciences, Imam-Reza Medical Center, Mashhad University of Medical Sciences.
4. Assistant of Dermatology, Imam-Reza Medical Center, Mashhad University of Medical Sciences
5. Assistant Professor, Health & Social Medicine Dept., Quaem Medical Center, Mashhad University of Medical Sciences.
6. General practitioner

scalp [4]. This association has also been discussed to be present in psoriasis of glans penis and guttate psoriasis [5,6].

It has been noted that psoriatic patients have immunologic responses to both malassezia yeasts and to proteins derived from them, and T cells reactive to the yeasts have been isolated from psoriatic skin lesions [7]. On the other hand serum antibodies to malassezia were detected in psoriatic subjects, but not in control subjects [8].

Among the effective medicines on malassezia, administering ketoconazole has been effective in amelioration of scalp psoriasis[9], and administering Itraconazole prior to medicating the scalp with calcipotriol considerably reduces skin irritation caused by calcipotriol probably by decreasing malassezia [10]. In spite of several studies certifying the role of malassezia in psoriasis, a doubt still remains if there is an inducing relation between malassezia infestation with psoriasis or not.

Since there has not been a study on the subject, we aimed to investigate this link in order to submit any possible new approaches for the treatment of psoriasis.

Methods

In this case-control study with easy sampling method, 50 psoriatic subjects who had consulted with the Dermatology ward of Imam Reza Hospital in Mashhad from Dec 2004-July 2005 were selected as the case group and 50 normal individuals who were matched in sex and age with patients as the control group were assayed and compared for infestation with malassezia yeast on the scalp and trunk.

Including criterion to the study consist of:

1. Pathological confirmation for psoriasis on scalp or trunk
2. No use of antifungal therapy during 4 weeks prior to the study
3. Not being bathed within 48 hours prior to the sampling
4. Not using topical cream or ointment within 2 weeks before taking smears
5. Filling out the consent form.

Case and control groups were referred to the parasitology laboratory of Imam Reza Hospital, smears from scalp and trunk skin lesions of cases and the same location of control group were taken, then slides were supplied. Samples were stained by methylene blue and an expert laboratory staff assayed them for malassezia yeast, and the results were as follows:

0→no presence of malassezia yeast in any microscopic field with 100× magnification

+1→1-4 malassezia yeast in any microscopic field with 100× magnification

+2→5-10 malassezia yeast in any microscopic field with 100× magnification

+3→more than 10 malassezia yeast in any microscopic field with 100× magnification

+4→presence of uncountable numbers of malassezia yeast in each microscopic field with 100× magnification

Finally patient demographic data, disease data and laboratory tests results were written in questionnaires. Statistical analysis was performed by SPSS version 11.5 software using Mann-Whitney, χ^2 tests and logistic regression.

Results

From 50 patients 30 (60%) were male and 20(40%) were female. 11 (22%) had a positive and 39(87%) had a negative family history of psoriasis. Patients' average age was 36.4 yr. (standard deviation 17.3). 41(82%) had and 9 (18%) had no scalp involvement. Laboratory results of psoriatic and normal subjects on scalp skin infestation with malassezia are presented in Table 1. No significant difference was detected between the two group, (P =0.86) according to table information. Similar results of trunk infestation with malassezia are presented in Table 2. There was a significant difference between the two groups; while trunk infestation with malassezia is lower in psoriatic patients (Z= -3.847, P<0.000). According to Table 3 (P=0.069),

Infested group with malassezia	Control		Case		Total	
	No.	%	No	%	No.	%
Not infested	15	37.5	14	34.1	29	35.8
1+	10	25	11	26.8	21	25.9
2+	6	15	6	14.6	12	14.8
3+	6	15	9	22	15	18.5
4+	3	7.5	1	2.4	4	4.9
Total	40	100	41	100	81	100

Table 1. Frequency distribution in two control and psoriasis groups according to scalp skin infestation with malassezia in referred subjects to Dermatology ward of Imam Reza Hospital between Dec 2004-July 2005.

no significant relation was proven between scalp involvement with psoriasis and malassezia infestation: but considering the P value we find it considerable.

We ascertained a significant and reverse relation between psoriasis duration and scalp infestation with malassezia (P =0.04).

Conclusion

Malassezia's role in psoriasis is not yet determined, but several reports have associated these lipophilic yeasts with the development of skin lesions in psoriasis.

Genus Malassezia which is a normal part of skin flora is associated with many skin disorders. It is generally accepted that Pityriasis versicolor and Malassezia folliculitis are caused by malassezia yeasts. In the case of seborrheic dermatitis and dandruff, the causative role of malassezia has become clear, but the role of specific species is still being defined. Some proofs for this link is also found in atopic dermatitis and psoriasis [2].

All types of malassezia have morphologic characteristics which help to differentiate them from other yeasts. Gueho et al in 1996 classified malassezia genus into 7 species (applying morphology and ultrastructural verification) to: M. globosal, M. restricta, M. obtusa, M. slooffiae, M. sympodalis, M. furfur; and non lipid dependent M. pachydermatis [11]. Recently two new types have been isolated: M. dermatis from atopic cases [12] and M. equi [13] from normal horse skin.

Two species, malassezia ovale and malassezia orbicularis, have been known for Malassezia genus in the past which is now called M. globosa instead of orbicularis species and M. restrica instead of ovale species.

Malassezia not only has been interfering in the above mentioned skin disorders but in several nosocomial systemic infections [14].

Psoriasis cases which had the highest link with this yeast were types with tendency to involve

Infested group with malassezia	Control		Case		Total	
	No.	%	No.	%	No.	%
Not infested	15	62.5	48	96	63	85.1
1+	4	16.7	2	4	6	8.1
2+	2	8.3	0	0	2	2.7
3+	3	12.5	0	0	3	4.1
4+	0	0	0	0	0	0
Total	24	100	50	100	74	100

Table 2. Frequency distribution in two control and psoriasis groups according to trunk skin infestation with malassezia in referred subjects to Dermatology ward of Imam Reza Hospital between Dec 2004-July 2005.

Scalp infestation with malassezia	Positive		Negative		Total	
	No.	%	No.	%	No.	%
Negative	12	33.3	2	40	14	34.1
1+	10	27.8	1	20	11	26.8
2+	5	13.9	1	20	6	14.6
3+	9	25	0	0	9	22
4+	0	0	1	20	1	2.4

Table 3. Comparing scalp infestation rate with malassezia in referred psoriatic subjects to the Dermatology ward of Imam Reza Hospital between Dec 2004-July 2005.

the scalp [4], so therapeutic response of scalp psoriasis to ketoconazole [9] and presence of M. ovalis (probably the same M. restrica) in cases with scalp psoriasis [15] approve this hypothesis. Faergemann et al proved in their study that patients with scalp psoriasis who had received Itraconazole prior to calcipotriol treatment to reduce malassezia had significantly decreased irritation due to calcipotriol [10]. It is recently asserted that malassezia yeast may have a role in glans penis and guttate psoriasis [5,6].

Clinically psoriasis lesions in some cases may look similar to seborrheic dermatitis which is also called sebopsoriasis [1]. On the other hand it is observed that seborrheic dermatitis of the face in psoriatic patients under PUVA therapy was more prevelalent than other subjects under the same therapy [16]. Psoriatic patients have immunologic responses to both malassezia yeast and to proteins derived from them and T cells reactive to yeasts have been isolated from lesional skin [7]. Some antibodies are found in the serum of psoriatic patients, but not of control group [8], which attack N-acetylglucosamine terminal of glycoproteins of malassezia [17].

Kanda et al have discovered that malassezia yeasts induce th1 and th2 related cytokine, chemokine, and PGE2 production in peripheral blood mononuclear cells from patients with psoriasis and atopic dermatitis [18].

Evidences prove that malassezia have role in pathogenesis of atopic dermatitis and psoriasis through inducing allergic and inflammatory reactions in the host [3].

Ketoconazole treats psoriasis through not only direct antifungal effect, but also by indirect effect of suppressing inflammatory reactions mediating by malassezia which shows a probable role of inflammatory reactions due to malassezia in pathogenesis of psoriasis [19].

In a study on psoriasis skin biopsies with positive and negative malassezia, TGF1 up regulation, Integrin chain and HSP70 expression in keratinocytes through AP1 dependent mechanism due to malassezia in the positive malassezia lesions was proven, so malassezia can have a role in overproduction of molecules intervening in cell migration and hyperproliferation [20].

Malassezia probably has also a role in the psoriasis Kobner phenomenon by chemotaxis of polymorphonuclear leukocytes [21]. Gupta et al have found that of 6 malassezia species recovered from all patients, M. globosa was the most frequently isolated one from patients with psoriasis and seborrheic dermatitis [30].

While in another study the most common isolated species taken from patients are M. sympodalis and M. furfur [22].

Gupta showed that M. globosa is isolated from the forehead, scalp and trunk with equal frequency [23]. On the other hand a recent study has reported significant differences in distribution of malassezia species between psoriatic and healthy scalp skin, and in the distribution of malassezia species according to the severity of the scalp involvement [24]. This study also contrary to control group showed that the most common dominating malassezia species in scalp psoriasis are M. globosa (55%), M. slooffiae (18%) and M. restrica (15%), the

latter being the most common species isolated from normal scalp skin.

In our study, there was a significant difference between case and control groups on trunk infestation with malassezia (P <0.000), considering that normal subjects had more Malassezia yeast on the trunk compared to psoriatic patients. There was no relation between the two groups in scalp skin infestation with malassezia (P=0.86). These findings can represent unsuitable condition of psoriasis lesions with dry scales for lipophilic malassezia yeast. It is probable on the other hand that more infestation of skin in normal cases can be due to colonization with M. restrica which is the most frequent type on normal skin but less common in psoriasis, therefore any careful conclusion on this subject needs determining malassezia species on further studies.

Frequency of M. restrica on normal but not on psoriatic skin showed that psoriasis skin is unsuitable for malassezia species of normal skin. So it is possible as psoriasis begins and skin starts changing, malassezia species and the type of pathologic reactions change as Gupta has confirmed this point [3].

Although a significant relation in comparing malassezia infestation of psoriatic patients with or without scalp involvement wasn't found (P=0.069), but the relation is considerable, and shows that malassezia involvement is higher in patients with scalp psoriasis compared with psoriasis of other parts of the body; Prohic et al have proved this relation [24].

We can probably establish antifungal medications as an effective supplementary treatment on scalp psoriasis especially in severe cases.

There is a significant and reverse relation between duration of scalp psoriasis and malassezia infestation (P=0.04) which can be a proof for the role of malassezia in inducing inflammatory and immune mechanisms to initiate psoriasis, particularly in the scalp. But as disease is initiated, malassezia yeast gradually decreases due to the unsuitable psoriasis skin environment for malassezia. Malassezia infestation is high at early stages of disease and can be showed by measuring anti-malassezia antibody levels despite low infestation during the chronic stage.

Distribution of different types of malassezia on different parts of body varies [24,25]. This point itself can be the reason for the lack of a causative relation between malassezia infestation and particularly trunk psoriasis in our patients.

Finally, we recommend the conduction of studies with greater number of sample size along with determining malassezia species and evaluation of anti-malassezia antibodies in psoriatic patients along with comparative investigations on antifungal drugs and common treatment effects on scalp psoriasis.

References

1. Griffiths CEM, Camp RDR, Barker JNWN. Psoriasis, In: Burns T, Breathnach S, Cox N, Griffiths CH. Rook's Textbook of Dermatology. 7th ed. Oxford: Blackwell Science Publication 2004; 35:1-50.

2. Donnarumma G, Paoletti I, Buommino E, et al. Malassezia furfur induces the expression of beta-defensin -2 in human keratinocytes in a protein kinase C-dependent manner. Arch Dermatol Res 2004; 295(11): 474-81.

3. Gupta AK, Batra R, Bluhm R, Boekhout T, Dawson TL Jr. Skin diseases associated with Malassezia species. J Am Acad Dermatol 2004; 51(5):785-98.

4. Van de Kerkhof PC, Franssen ME. Psoriasis of the scalp:diagnosis and management. Am J Clin Dermatol 2001; 2:159-65.

5. Mayser P, Schutz M, Schuppe HC, Jung A, Schill WB. Frequency and spectrum of Malassezia yeasts in the area of the prepuce and glans penis. BJU Int 2001; 88:554-8.

6. Sandhu K, Jain R, Kaur I, Kumar B. Role of Pityrosporum ovale in guttate Psoriasis. J Dermatol 2003; 30(3):252-4.

7. Barker BS, Powles A, Garioch JJ, Hardman C, Fry L. Differential T-cell reactivity to the round and oval forms of Pityrosporum in the skin of patients with Psoria-

sis. Br J Dermatol 1997; 136:319-25.

8. Squiquera L, Galimberti R, Morelli L, Plotkin L, Milicich R, Kowalckzuk A, et al:Antibodies to proteins from pityrosporum ovale in the sera from patients with psoriasis. Clin Exp Dermatol 1994; 19:289-93.

9. Rosenberg EW, Belew PW. Improvement of psoriasis of the scalp with ketoconazole. Arch Dermatol 1982; 118:370-1.

10. Faergemann J, Diehl U, Bergfelt L, Brodd A, Edmar B, Hersle K, et al. Scalp Psoriasis : synergy between the malassezia yeast and slight irritation due to calcipotriol. Acta Derm Venereol 2003; 83(6):438-41.

11. Gueho E, Midgley G, Guillot J. The genus Malassezia with description of four new species. Antonie Van Leeuwenhoek 1996; 69:337-55.

12. Sugita T, Takashima M, Shinoda T, Suto H, Unno T, Tsuboi R, et al . New yeast species. Malassezia dermatis, isolated from patients with atopic dermatitis. J Clin Microbiol 2002; 40:1363-7.

13. Nell A, James SA, Bond CJ, Hunt B, Herrtage ME. Identification and distribution of a novel Malassezia species yeast on normal equine skin. Vet Rec 2002; 150:395-8.

14. Chang HJ, Miller HL, Watkins N, Arduino MJ, Ashford DA, Midgley G, et al. An epidemic of Malassezia pachydermatis in an intensive care nursery associated with colonization of health care worker's pet-dogs. N Eng Med 1998; 338:706-11.

15. Rosenberg EW, Noah PW, Skinner RBJr, Vander ZR, West SK, Browder JF. Microbial association of 167 patients with Psoriasis. Acta Derm Venerol Suppl (stockh) 1989; 146:72-4.

16. Holden CA , Berth-jones J. Eczema, lichenification, Prurigo and Erythroderma. In: Burn T, Breathnach S, Cox N, Griffiths CH. Rook' s Textbook of Dermatology. 7th ed. Oxford: Blackwell Science Publication; 2004:17.1-55.

17. Mathov I, Plotkin L, Abatangelo C, Galimberti R, Squiquera L, et al. Antibodies from patients with Psoriasis recognize N-acetylglucosamine terminals in glycoproteins from pityrosporum ovale. Clin Exp Immunol 1996 Jul; 105(1):79-83.

18. Kanda N, Tani K, Enomoto U, Nakai K, Watanabe S. The Skin fungus-induced Th1- and Th2- related cytokines, chemokine and Prostaglandin E2 production in peripheral blood mononuclear cells from patients with atopic dermatitis and psoriasis vulgaris. Clin Exp Allergy 2002; 32:1243-50.

19. Alford RH, Vire CG, Cartwright BB, King LE . Ketoconazole's inhibition of fungal antigen-induced thymidin uptake by lymphocytes from patients with psoriasis. Am J Med Sci. 1986; 291(2):75-80.

20. Barani A, Paoletti I, Ruocco E, Agozzine M, Tufano MA. A possible role of Malassezia furfur in psoriasis: modulation of TGF-beta 1 , integrin, and HSP 70 expression in human keratinocytes and in the skin of psoriasis–affected patients. J Cutan Pathol 2004; 31(1):35-42.

21. Bunse T, Mahrle G. Soluble pityrosporum-derived chemoattractant for polymorphonuclear leukocytes of psoriatic patients. Acta Derm Venereol 1996;76(1):10-2.

22. Hernandez Hernandez F, Mendez Tovar LJ, Bazan Mora E, Arevalo Lopez A, et al. Species of Malassezia associated with various dermatoses and healthy skin in the Mexican population. Rev Iberoam Micol 2003; 20(4):141-4.

23. Gupta AK, Kohli Y, Summerbell RC, Faergemann J. Quantitative culture of malassezia species from different body sites of individuals with or without dermatoses. Med Mycol 2001; 39(3):243-51.

24. Prohic A, Identification of Malassezia species isolated from scalp skin of patents with psoriasis and healthy subjects. Acta Dermatovenereol Croat 2003; 11:10-6.

25. Borelli D. [Pityriasis versicolor due to Malassezia ovalis]. Mycopathologia 1985; 147-53.

26. Faergmann J, Fredrikson T. Experimental infections in rabbits and human with pityrosporum orbicularis and P oval. J Invest Dermatol 1981;77:314-8.