

Original Research Article

Clinico epidemiological and mycological study of pityriasis versicolor

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ABSTRACT

Background: Pityriasis versicolor, a chronic superficial fungal infection caused by lipophilic yeasts of the genus, *Malassezia* is a common infection in the tropical and subtropical regions. Objective was to study the epidemiology, clinical presentation, associations, etiological agents and clinico-mycological correlation of pityriasis versicolor.

Methods: Hundred patients with clinical diagnosis of pityriasis versicolor who attended the mycology out-patient (OP) clinic between September 2014 and August 2015 were enrolled. Skin scrapings from these patients were subjected to 10% potassium hydroxide (KOH) and culture.

Results: Out of the 100 patients with pityriasis versicolor (PV), 70% were males and 30% were females and the most affected age group was between 21-30 years (43%). The youngest age affected was a 13 years old male while the oldest was a 65 years old male. Duration of the infection ranged between 1 month to 6 months in 65% while it was more than 1 year in 9% of patients. Recurrence was observed in 35% of them. Back was the most common site (48%) to be involved. Seventy percent of patients had more than 30% body surface area involvement. Achromic type of PV was the most common clinical presentation in 68% of patients. Out of the 76 isolates, *Malassezia globosa* was the predominant isolate (48.7%), followed by *M. sympodialis* (25%), *M. furfur* (10.5%), *M. restricta* (7.9%) and *M. obtusa* (6.6%).

Conclusions: Achromic type of PV is the most common clinical presentation. *Malassezia globosa* is the most common etiological agent of pityriasis versicolor.

Keywords: Achromic, Chronic, *Malassezia*, Pityriasis versicolor

INTRODUCTION

Pityriasis versicolor is a chronic, superficial fungal infection, first described by Wilan in 1901.¹ It is one of the three common superficial fungal infections that affects the human beings, the other two being dermatophytosis and candidiasis. This infection is more common in the tropical regions due to the prevalence of hot and humid climate. It is a chronic infection of the stratum corneum, caused by lipophilic yeasts of *Malassezia* genus which are commensal members of the normal skin flora.² As a commensal, *Malassezia* exists in the yeast form in the areas of the body rich in sebaceous

glands and gets converted into the mold form which is the cause for the infection. This transformation occurs in the presence of certain predisposing factors which may be endogenous or exogenous. Factors such as hyperhidrosis, malnutrition, Cushing syndrome, use of systemic corticosteroids and immunosuppression predispose an individual to develop pityriasis versicolor.³ The genus *Malassezia* includes 15 lipophilic species namely *M. globosa*, *M. sympodialis*, *M. furfur*, *M. restricta*, *M. slooffiae*, *M. obtusa*, *M. pachydermatis*, *M. dermatis*, *M. nana*, *M. yamotensis*, *M. caprae*, *M. equina*, *M. cuniculi*, *M. japonica* with the recent addition of the new species "*Malassezia arunalokei*".⁴ Of these, *M. globosa*, *M.*

sympodialis and *M. furfur* are known to be the predominant etiological agents causing pityriasis versicolor.⁵ This infection is clinically characterised by the presence of well-defined hypopigmented or pigmented macules and patches with fine bran like scales. Residual hypopigmentation and recurrent episodes are the two main issues faced by the patients with pityriasis versicolor. In this background, this study was planned to study the epidemiology, clinical presentation, associations, etiological agents and clinico-mycological correlation of pityriasis versicolor.

METHODS

This prospective, descriptive, cross-sectional study was conducted in the mycology section, department of dermatology in a tertiary centre at Chennai. Hundred patients with pityriasis versicolor who attended the mycology OP between September 2014 and August 2015 were enrolled in the study. Patients with clinical signs of pityriasis versicolor, KOH positivity for *Malassezia* and those who have not been on topical or oral antifungal medication 1 month prior to study were the inclusion criteria. Patients who have taken topical or systemic antifungal treatment within 1 month prior to the study and those with KOH negativity for *Malassezia* were excluded.

Detailed case history of each patient with reference to age, sex, occupation, seasonal variation, family history and other associated systemic conditions such as diabetes, tuberculosis, endocrine diseases, immune-suppressive states (HIV, transplant patients, internal malignancy) was taken. History with regard to other associated dermatological disorders such as acne, seborrhoeic dermatitis, dermatophytosis, candidiasis etc was also taken. Clinical features like site of involvement, percentage of body surface area, type of the lesion and other associated cutaneous disorders were noted. Blood haemogram, blood sugar, renal and liver function tests, serum cholesterol, blood grouping and typing were done. Blood VDRL for syphilis and ELISA for HIV infection were done in patients when indicated. Skin scrapings of each patient was examined in 10% KOH for the presence of hyaline, short, straight, angulated, aseptate hyphae with blastospores.

All the positive specimens were subjected to culture in modified Sabouraud's Dextrose Agar medium with chloramphenicol and cycloheximide with olive oil overlay and incubated at 32° C. Macroscopic appearance of the colony was observed every day for the suspected growth of *Malassezia* for 7 days and then at weekly intervals up to three weeks. Microscopic appearance was observed in lactophenol cotton blue mount. Speciation of *Malassezia* was done by Tween assimilation test. The data were analyzed using Statistical Package for Social Science Software (SPSS version 16). Continuous data were analysed with mean and standard deviation and count data were analysed with frequency.

RESULTS

Among the 100 patients, 70 were males (70%) and 30 were females with the male to female ratio of the 2.3:1. Forty-three (43%) patients were between the age group of 21-30 years followed by 27 patients (27%) belonging to 31-40 years. (Figure 1).

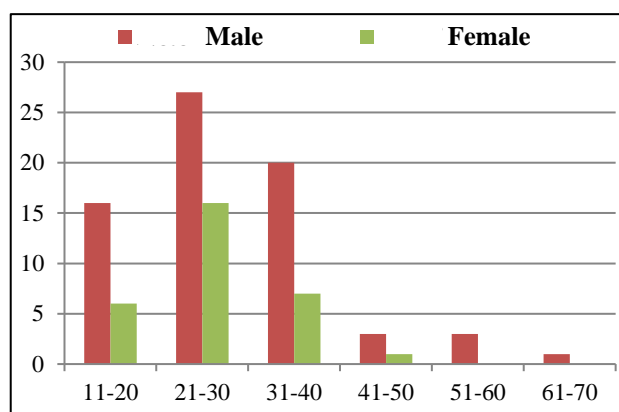


Figure 1: Age and gender distribution in the study population (n=100).

The youngest age was a 13 years old male and the oldest was a 65 years old male. The mean age was 30.89 years. In this study, 68 patients (68%) had come due to cosmetic concern while 32 (32%) patients had complaints of occasional pruritus. History of excessive sweating was present in 58 (58%) patients. Recurrence was reported in 35 (35%) of patients.

Duration of the infection ranged between 1 week to 1 month in 8 (8%) patients, 1 month to 6 months in 64 patients (64%), 6 months to 1 year in 19 patients (19%) and more than 1 year in 9 (9%) patients. In this study, 29 (29%) were students followed by skilled laborers 26 (26%), manual laborers (17%) and farmers 9 (9%) while the other categories were less common (Table 1).

Table 1: Distribution of occupation among the study group.

Occupation	No. of patients (n=100)	Percentage %
Student	29	29
Skilled labourer	26	26
Manual Labourer	17	17
Farmer	9	9
House wife	8	8
Shop keeper	8	8
House keeping	1	1
Security	1	1
Teacher	1	1

Majority of the patients (65%) belonged to urban population while 35 (35%) were from rural areas. Family history of similar infection was present in 31 (31%) of the

patients. Among the 100 patients, 28 (28%) patients had systemic association. Diabetes mellitus was present in 11 patients (39.3%), followed by hypertension in 7 patients (25%), pulmonary tuberculosis, post renal transplant and chronic kidney disease in each 2 (7.1%) patients (Table 2).

Table 2: Systemic associations among the patients.

Systemic associations	Number of patients (n=28)	Percentage %
Diabetes mellitus	11	39.3
Hypertension	7	25
Chronic Kidney disease	2	7.1
Pulmonary tuberculosis	2	7.1
Post renal transplant	2	7.1
Bronchiectasis	1	3.2
Nephrotic syndrome	1	3.2
Decompensated liver disease	1	3.2
Hypothyroidism	1	3.2

Out of the hundred patients, 58 patients (58%) had associated dermatological disorders, of which 21 patients (36.2%) had seborrheic dermatitis, 14 patients (24.1%) had acne, 11 patients had dermatophytosis (18.9%), 2 patients (3.4%) had candidiasis and lichen planus. Other conditions that were associated were insignificant. Back of the trunk was the most common site to be involved in 46 patients (46%) followed by face and neck in 26 (26%), chest in 17 (17%) patients, arms in 9 (9%) and shoulder in 2 (2%) patients (Figure 2).

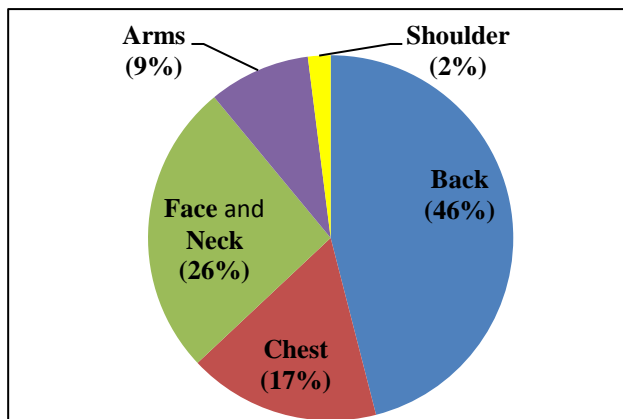


Figure 2: Distribution of involved site in pityriasis versicolor patients (n=100).

Seventy patients (70%) had more than 30%-50% body surface area (BSA) involvement, followed by 26 (26%) with 10%-30% BSA affected and 2 patients (2%) each with less than 10% and more than 50% BSA involved. Majority of the patients (68%) presented with achromic type of PV while 23 (23%) had chromic type of PV and 9 (9%) patients had mixed type with both achromic and

chromic presentations (Figure 3, Figure 4 and Figure 5).

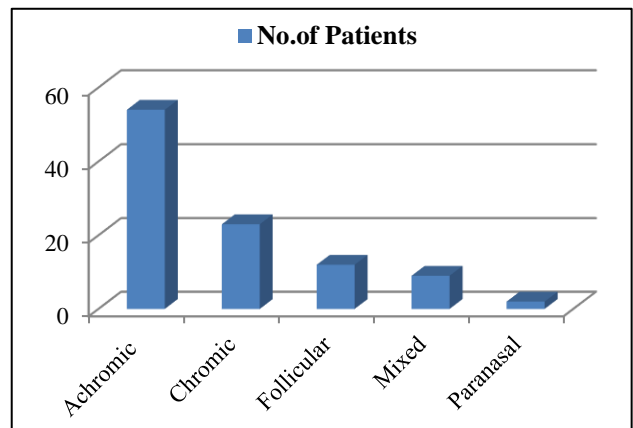


Figure 3: Distribution of clinical types of Pityriasis versicolor.



Figure 4: Achromic type of pityriasis versicolor.



Figure 5: Chromic type of pityriasis versicolor.

Among the 68 patients with achromic type, 12 had follicular type (Figure 6) and 2 adolescent patients had paranasal type of PV. In this study, blood group A was found in 52 patients (52%) followed by O group in 38 patients (38%), B group in 9 (9%) and AB blood group in 1 (1%) patient.



Figure 6: Follicular type of pityriasis versicolor.

As KOH positivity was the inclusion criteria, examination of the skin scrapings revealed hyaline, short, straight, angulated, aseptate hyphae with blastospores in all the patients. In some patients with achromic type and all patients with chronic type, hyphae were seen along with groups of yeast cells resulting in the characteristic “Spaghetti and meatballs” or “Banana and grapes” forms (Figure 7).

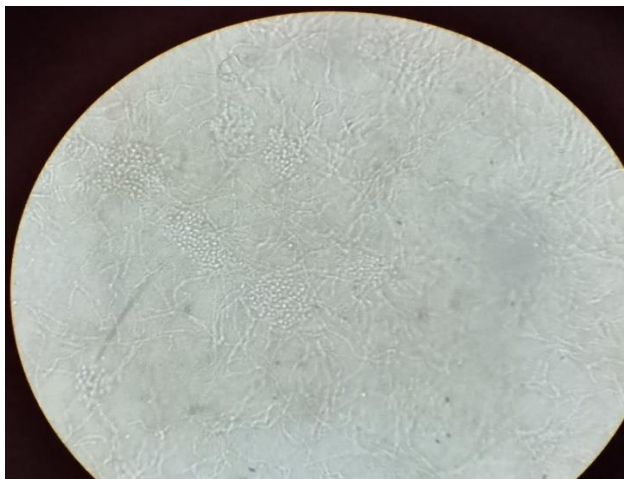


Figure 7: KOH mount - *Malassezia* species seen as short, straight or angulated, aseptate, hyaline hyphae with groups of spores showing ‘spaghetti and meat ball’ appearance.

Out of the 100 samples, *Malassezia* was isolated in 76 (76%). Yeast-like, small cream to coloured colonies with slightly raised edges were seen (Figure 8).



Figure 8: Yeast -like colonies of *Malassezia* species grown on Modified Sabouraud's dextrose agar overlaid with olive oil.

Microscopic examination in lactophenol cotton blue/ Gram's stain revealed the presence of yeast cells with occasional hyphae (Figure 9).

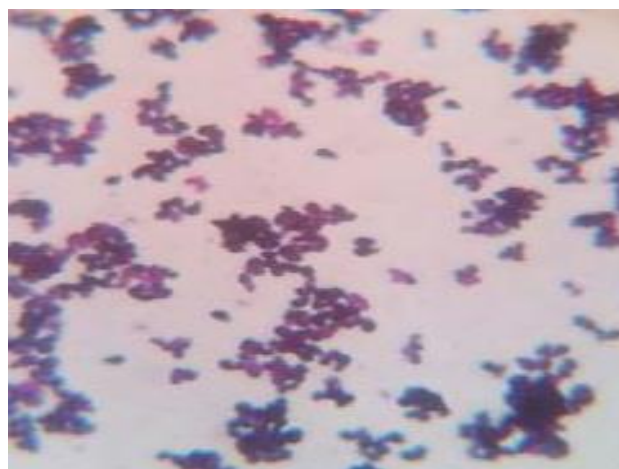


Figure 9: Gram smear from culture on SDA showing spherical yeast cells with budding.

Of the 76 isolates, *Malassezia globosa* was the most common species isolated in 37 patients (48.7%), followed by *M. sympodialis* in 19 patients (25%), *M. furfur* in 8 patients (10.5%), *M. restricta* in 6 (7.9%) and *M. obtusa* in 5 patients (6.6%) and *M. sloffiae* in 1 (1.3%) patient (Table 3, Figure 10).

Out of the 47 isolates from patients with achromic PV, *M. globosa* was the most common (23, 48.9%) followed by *M. sympodialis* (12, 25.5%). Similarly, among the 29 isolates from the chronic PV patients, *M. globosa* was

the most common (14, 48.3%) followed by *M.symphodialis* (7, 24.1%) (Table 4, Figure 11).

Table 3: Distribution of *Malassezia* species in the study population.

<i>Malassezia</i> species	Number of patients (n=76)	Percentage %
<i>M. globosa</i>	37	48.7
<i>M. sympodialis</i>	19	25
<i>M. furfur</i>	8	10.5
<i>M. restricta</i>	6	7.9
<i>M. obtusa</i>	5	6.6
<i>M. slooffiae</i>	1	1.3

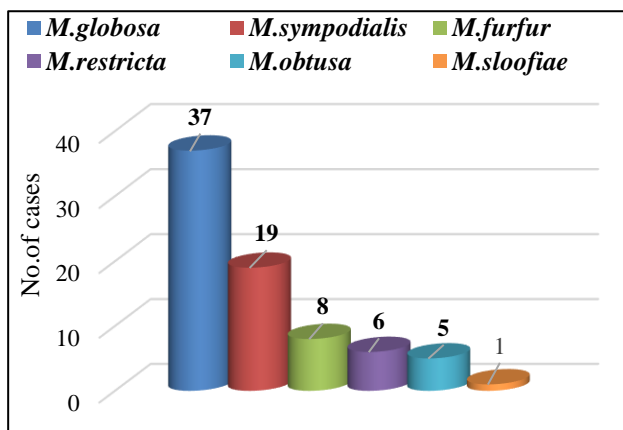


Figure 10: Distribution of *Malassezia* species in the study population (n = 76).

Table 4: Correlation between the isolate and clinical type of Pityriasis versicolor.

Culture	Total (n=76)	Achromic type (n= 47)	%	Chromic type (n=29)	%
<i>M. globosa</i>	37	23	48.9	14	48.3
<i>M. sympodialis</i>	19	12	25.5	7	24.1
<i>M. furfur</i>	8	5	10.6	3	10.3
<i>M. restricta</i>	6	5	10.6	1	3.4
<i>M. obtusa</i>	5	2	4.3	3	10.3
<i>M. slooffiae</i>	1	0	3.4	1	3.4

DISCUSSION

Pityriasis versicolor also known as “Tinea versicolor” is a common superficial fungal infection in the tropical countries, predominantly seen in adolescents and young adults. In this study, the age group most commonly affected was 21-30 years (43%). Various other studies have also reported the occurrence of pityriasis versicolor most commonly in this age group.⁶⁻¹¹ This may be explained by the fact that there is increased sebum production during this period and *Malassezia* being lipophilic, affects these individuals more often. Males

(70%) outnumbered females (30%) in the study population. This is in accordance with the studies by Archana et al, Rao et al, Kabbini et al, and in which they observed 73%, 73.3% and 71% respectively.^{7,12,13}

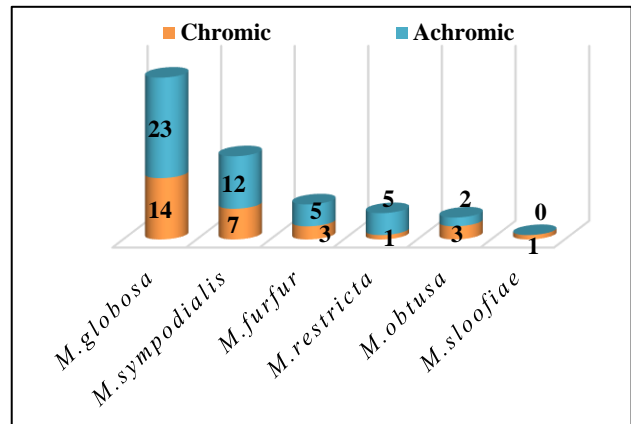


Figure 11: Correlation between the various *Malassezia* isolates and clinical type of Pityriasis versicolor (n = 76).

The higher incidence in males in this study, may be attributed to the increased outdoor activities of males for occupational purposes, predisposing them to a higher chance of sun exposure and humidity, which favors the growth of *Malassezia* yeasts. Pityriasis versicolor is mostly an asymptomatic infection, with pruritus being present only in a small proportion of patients. Pruritus occurs particularly during sweating and the intensity is usually mild. Even in this study, majority of the patients were asymptomatic and had come only because of their cosmetic concern. Pruritus was present in 32% patients similar to the observations made by Rao et al, (30%) and Hasan et al, (39.1%).^{12,14} Duration of the infection in the majority (64%) of the patients was between 1 to 6 months. Kristany et al, observed that 72% of the patients presented with duration of lesions between 1 month and 1 year.¹⁵ In the present study, 35% of the patients had history of recurrence in conformity with studies by Krishnan A et al, (35%) and Kambil et al, (36.8%).^{16,17} Ghosh et al, reported a recurrence rate of 48.1%.¹⁸ *Malassezia*, a commensal in the skin, exists in the yeast form and gets converted to the hyphal form in the presence of endogenous or exogenous predisposing factors and this explains the recurrent nature of this infection. In this study, pityriasis versicolor was most commonly seen among the students (29%) as was observed by Ghosh SK et al, (29.09%), Shah A et al, (30.2%) and Morais PM et al, (37.1%).^{1,10,18} There is increased activity of sebaceous glands under the hormonal influence in adolescents and young adults and this explains the increased frequency of PV among the student population. In addition, students are also more involved in sports activities which predisposes them to increased sweating and hence, pityriasis versicolor. Majority of the patients belonged to urban population (65%) and this is due to the fact that our centre caters

predominantly to urban and semi-urban population. A positive family history was observed in 31% of patients in accordance with the studies done by Ghosh et al, (25.5%), Hasan et al, (26.6%) and Kambil et al, (34.2%).^{14,17,18} Hafez et al, found a positive family history in 39% of patients and reported that there is a polygenetic and multifactorial inheritance.¹⁹ He SM et al, observed that the patients with a positive family history had an early age of onset, higher recurrence and longer duration of infection.²⁰

Achromic PV (68%) was the most common clinical presentation followed by chromic PV (23%) and mixed type (9%) in correlation with the studies conducted by Kabbin J et al, (67%, 31%, 2%), Kambil et al, (44.3%, 31.5%, 24%), Krishnan et al, (84%, 9%, 6%) and Shah et al, (84.1%, 8.6%, 7.1%).^{10,13,16,17} Though hypopigmented type was the most common variety in the studies by Ghosh et al, (81.8%) and Morais et al, (62.9%) as in this study, mixed type was the second common (14.5%, 29.3%) in their studies.^{1,18} This variation could be attributed to the change in the population and the climatic conditions. Various mechanisms have been postulated as cause of hypo and hyperpigmentation in pityriasis versicolor. Azelaic acid produced by *Malassezia* species causes competitive inhibition of tyrosinase and results in hypopigmentation. Electron microscopic studies had revealed the presence of smaller melanosomes in achromic pityriasis versicolor and abnormally large melanosomes in the chromic type.⁵ In this study, back of trunk (46%), was the most common site to be involved followed by face and neck (26%). This is similar to the studies by Rao GS et al, (70%), Kristany et al, (76.5 %) and Chaudary et al, (80%).^{12,15,21} The increased frequency of involvement of the trunk, face and neck may be explained by the presence of higher density of sebaceous glands in these sites.

Among the 100 patients, 28% patients had systemic associations, of which diabetes mellitus was the most common (39.3%), followed by hypertension (25%) and pulmonary tuberculosis (7.1%). This is in accordance with the study conducted by Kambil et al, in which 35.2% of the patients were found to have diabetes mellitus.¹⁷ Seborrhoeic dermatitis (36.2%) was the most common dermatological association of pityriasis versicolor in this study, followed by acne (24.13%). All the three conditions have *Malassezia* species involved in their pathogenesis. Crespo Erchiga et al and Tabaseera N et al reported association of seborrhoeic dermatitis in 40% and 31.4% of patients respectively.^{8,22} Majority of the patients had blood group A (52%), followed by blood group O (38%). This is contrary to the study by Kareema et al, in 2014, in which blood group O (74%) was most commonly associated followed by blood group A (13.9%) and blood group B in 10.7% of patients.²³ Study by Joshua et al, also reported O group to be the commonest association (40%) followed by 23% each of blood groups A and B.²⁴ Hence, further large-scale study is essential to draw a conclusion regarding the association

of blood groups.

KOH positivity was 100% in this study as it was an inclusion criteria. Apart from potassium hydroxide, other stains that could be used for direct microscopic examination are methylene blue, Albert's stain, Parker Quink Blue black ink and Calcofluor White stain. Kabbin et al reported that Calcofluor white staining is a rapid, simple, sensitive and a highly reliable method for identification of fungi, with a major limitation being the requirement of a fluorescent microscope.¹³ The isolation rate of *Malassezia* species was 76% in this study. Kindo et al, reported a recovery rate of 68.75%, Kaur et al, 93.1%, Shah et al, 50.35% and Archana et al, 70% in 2015.^{7,9,10,25} The differences in the isolation rates in the various studies may be due to the differences in sampling techniques and the use of different media for culture like SDA with olive oil and modified Dixon's medium. In the present study, the most common species isolated was *M. globosa* (48.7%) followed by *M. sympodialis* (25%) and *M. furfur* (10.5%). Worldwide studies have reported *M. globosa* as the predominant isolate in pityriasis versicolor.^{3,26-28} *M. globosa* was the predominant isolate in the various studies done in India by Kaur et al, (51.79%), Chaudhary et al, (57.5%), Shah et al, (48.57%) and Thayikannu et al, which is in conformity with the present study.^{9,10,21,29} In this study, *M. globosa* was the most common species isolated from both first episode (52%) and recurrent attacks (43%). Pathogenicity of *M. globosa* is considered to be due to the increased enzymatic activity of esterase and lipase compared to the other species of *Malassezia*.²⁷ While the second common organism was observed to be *M. sympodialis* by Chaudhary et al, from Varanasi and Kaur et al, from Patiala similar to our study, it was *M. furfur* in the study by Shah A et al, from Mumbai.^{9,10,21} Kindo et al, reported *M. sympodialis* to be the most common isolate followed by *M. globosa*.²⁵ *M. sympodialis* emerged as the predominant isolate followed by *M. furfur* in the study by Archana et al from Kolar. *M. furfur* was observed to be the most common isolate followed by *M. globosa* in the study done at Assam by Sharma et al.⁶ This variation in the prevalence of *Malassezia* species could be attributed to the different geographical locations. In this study, *M. globosa* was the most common species isolated from both achromic (48.9%) and chromic (48.2%) types of PV. This is in concordance with the studies by Thayikannu et al, and Shah et al, who also reported *M. globosa* to be the most common isolate in both achromic and chromic types of PV.^{10,29}

CONCLUSION

Pityriasis versicolor is a common, superficial fungal infection known for its recurrence and cosmetic concern of the patients. Lifestyle modification in susceptible individuals in terms of loose cotton fabrics and personal hygiene will help to reduce sweating, which is one of the important endogenous factors known to result in recurrent episodes. Achromic type is more common than

the chromic variety. *Malassezia globosa* which is the predominant etiological agent worldwide, was the most common etiological agent of pityriasis versicolor in this centre in Tamilnadu.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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