Original article

A Single Centre Demographic and Clinico-epidemiological Profile of Pityriasis Versicolor in Adults: A Cross-Sectional Study

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Abstract:

Background: Pityriasis Versicolor (PV) is a chronic superficial fungal infection of skin caused by lipophilic yeast *Malassezia species*. Its prevalence, predisposing factors and clinical presentations varies in different geographical locations around the world. Despite being a common disease, its diagnosis and treatment remain a challenge. The aim of this study was **t**o document the clinico-epidemiological characteristics of the participants diagnosed with PV. ***Materials and Methods****:* A descriptive cross-sectional study was carried out on 104 consecutive participants attending the Outpatient Department of National Research Institute of Unani Medicine for Skin Disorders, Hyderabad during 1st July, 2020 and 31stJuly, 2021. Their demographic data, risk factors, clinical features, and temperament were recorded in the case record form. The participants were diagnosed clinically and confirmed by direct microscopy. The data were analysed retrospectively. ***Results:*** In this study, 75 participants (72%) were males and the ratio of male to female was 2.6:1. The most frequently affected participants were in 20–40 years of age group. The mean age was 29.14 (±10.52) years. PV was present in 28.8% students, 21.15% workers, 31.7% employees, 11.5% housewives and 6.7% businessmen. The most common affected site was back followed by neck and chest. PV was found prone to the Fitzpatrick skin types 4 (49.03%) and 3 (27.8%). Hypo-pigmented lesions were more common.The *Malassezia species* was present in multiple lesions of all the participants. ***Conclusions:*** This study documented the clinico-epidemiological profile of PV. The findings of this study may provide us current understanding of PV in India.

Keywords: achromic lesion; dermatomycosis, fungal; *malassezia* species; pityriasis versicolor.

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Introduction:

Pityriasis Versicolor (PV) is a superficial fungal infection,characterized by changes in skin pigment due to colonization of stratum corneum by a lipophilic yeast of genus *Malassezia* (formerly known as Pityrosporum).[1–3] The yeast belongs to normal skin flora that occurs in dimorphic form, existing in both yeast and mycelial phases.[3,4] Under appropriate conditions, the commensal yeast may transform into a parasitic filamentous form causing clinical presentations of PV.[3,5] PV is common in late teens and young adults of either gender except children.[6]

PV has a worldwide occurrence with a prevalence of 40-50% in tropical countries.[2] The causative fungus grows mostly in the warm and humid climate and so generally recurs in summer.[2,6] This dermatosis may be associated with other clinical conditions such as Cushing syndrome, malnutrition, pregnancy and unhygienic condition.[7–9] Positive family history, hyperhidrosis, hyperseborrhea, aerobic exercise,

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application of cocoa butter in young children and oily skin have been known predisposing factors of PV.[1,10,11]

Unlike dermatoses such as acne vulgaris and leptospirosis, PV is usually asymptomatic.[12–14] Its clinical features are hypopigmented or hyperpigmented macules with slight itching and fine scaling on the chest, back, abdomen, and proximal extremities.[11] It may sometimes affect face, groin, hands, scalp and genitalia.[2] Its pathophysiology has been explained in the literature.[15] *Malassezia furfur* synthesizes a specific compound called Pityriacitryn, an indole alkaloid, which absorbs ultraviolet light and protects fungus against sun exposure.[16] Azaleic acid produced by dicarboxylic acid inhibits the activity of tyrosinase causing melanocytes damage resulting in hypopigmentation.[17] The causative organism can be identified as spaghetti (short thick fungal hyphae) and meatball appearance (variously size spores) by direct microscopy of skin scrapings.[11]

The physicians face challenges to successfully treat PV due to its chronicity, chances of misdiagnosis and a higher rate of recurrence despite the availability of effective antifungal drugs.[18] Recently it has been reported that *Malassezia* species caused invasive bloodstream infection in immune-compromised patients.[19] Immunomodulation by Unani herbal preparations may be advised in such patients[20]. PV may be a comorbid condition in H. *pylori* infected patients.[7] This disease may causes significant impairment in quality of life mainly due to cosmetic purposes. Its prevalence and clinical presentations vary in different races and geographical regions.[8]

It is obvious from the above discussion that documentation of the demographic data, atypical clinical presentation, epidemiological characteristics and mycological profile of PV has multidimensional importance in clinical practice. Moreover, the literature search shows that there are very few demographic and epidemiological studies related to PV conducted in India in the recent past. The outcome of this study may be useful in the current understanding of PV in this geographical region. The data collected in this study may be useful for diagnosis and management of PV in clinical practice.

Materials and methods:

A single centre descriptive cross-sectional study was carried out to document the clinico-epidemiological profile of PV in the participants visiting Outpatient Departments of National Research Institute of Unani Medicine for Skin Disorders (NRIUMSD), Hyderabad, Telangana, India. This institute provides traditional Unani medical care as first line treatment to 200 patients of various skin diseases daily in its outpatients and inpatients departments. The patients visit this institute from the southern and western states of the country. We recruited 104 consequent participants diagnosed with PV in this study.

Selection criteria:

The participants of any sex aged 19-60 years diagnosed clinically with the presence of hypopigmented and/or hyperpigmented and/or erythematous macules, pruritus on the lesion, scaling / desquamation and confirmed by direct microscopy of the skin scrapings using 10% KOH. The participants with a serious comorbid medical condition and who had received any systemic or topical antimycotic therapy within a month of the start of the study were excluded.

Procedure of the study:

A detailed medical history of the participants including demographic data (age, gender, marital status, occupation, religion, address), chief complaints with duration, clinical features and other associated cutaneous disorders were noted in the predesigned case record form. The lesions were clinically examined for the presence of macules or papules, pigmentation, scaling, margin, symmetry, site, number of lesions, skin phototyping and body surface area involved. The Wood's lamp examination of the macules showing yellow to golden yellow fluorescence was considered diagnostic of PV. PV was confirmed by KOH mount examination of the skin scrapings by direct microscopy. Routine investigations were done to rule out systemic comorbid diseases.

Calculation of body surface area involved:

The total area of the body surface involved in PV was calculated as per Wallace Rule of Nines.[21] The entire head was estimated as 9% (4.5% for anterior and posterior), trunk as 36% (18% for anterior and 18% for the back), upper extremities as 18% [9% for each upper extremity], lower extremities as 36% (18% for each lower extremity) and groin as 1%.

Determination of Fitzpatrick skin phototype:

The Fitzpatrick skin phototype was determined by the constitutional colour of the skin (white, brown, or black) and the effect of exposure to ultraviolet radiation resulting in tanning. A person's skin type was described as type 1,2,3,4,5 and 6 according to the response of the different types of skin to ultraviolet (UV) light exposure.

Assessment of temperament:

The temperament of the participants was assessed based on 10 points scale. The parameters for the assessment of temperament are described in Table 1.

Table 1: Parameters for the assessment of temperament of the participants

Parameters	Sanguine	Phlegmatic	Bilious	Melancholic
Complexion	Ruddy	Whitish	Pale	Dark
Built	Muscular&Robust, *BMI: 23-24.9	Fatty, BMI: ≥25	Muscular & Thin,BMI: 20.5-22.9	Asthenic, BMI: <20.5
Body Texture & Touch	Tough & Hot B.T. 98.7-99.9^{0}F	Soft, Flabby &Cold, B.T. 97.5-98.6 ^{0}F	Hard, Dry&Hot, B.T. 98.7-99.9 ^{0}F	Hard, Dry &Cold, B.T. 97.5-98.6 ^{0}F
Hair	Dark Black,Lustrous&Thick, Rapid Growth	Black,Lustrous,Soft & ThinSlow Growth	Brown, Dry& Thin, RapidGrowth	Black, Dry, Coarse &Thin,Slow growth
Appetite	Good	Average	Good but Diet Decreased	Decreased
Perspiration	Excessive	Less	Excessive,Offensive	Very less
Sleep	Average (6-8 hours)	Excessive (>8 hours)	Inadequate (<6 hours)	Excessive (>8 hours) but disrupted
Pulse	Average (71-80/m)	Slow(60-70 bpm)	Rapid (81-100/m)	Slow (60-70 bpm)
Movement	Active	Inactive (Lazy)	Hyperactive	Hypoactive
Behaviour	Normal, Reacts Fast	Calm & Quiet, Reacts Slowly	Loses Temper Easily	Sleepy, Reacts Very Late

*BMI = Body Mass Index

Microscopy of skin scrapings:

Skin scrapings were obtained from multiple lesions with the help of glass slide. Smears were prepared with 10% KOH for direct microscopic examination with 10X and 40X magnification power. Microscopic examination was performed by Dr Syeda Hajra Fatima, Research Officer (Pathology). *Malassezia* species was confirmed by the presence of both hyphae and spores in direct microscopy.[17]

Statistical analysis:

Descriptive statistical analysis was carried out in this study. Continuous variables were presented as Mean ±S.D and categorical variables were discussed in frequencies and percentage. Microsoft excel 2019 was used to generate tables and calculate mean, standard deviation and percentage.

Ethical Clearance:

This study was approved by the Institutional Ethics Committee of NRIUMSD, Hyderabad on 25/11/2019 (Ref. No. 38-18/2018-19/NRIUMSD/Tech/IEC-11/08). All the participants signed the Informed Consent Form before enrolment into the study.

Results:

In this study we studied the demographic, epidemiological, clinical and mycological characteristics of 104 consequent participants diagnosed with PV in Outpatient Departments of the NRIUMSD, Hyderabad during 1stJuly, 2020 and 31stJuly, 2021. The collected data were analysed with respect to age, age groups, gender, socio-economic status, etc. The demographic and epidemiological characteristics of the participants have been presented in Table 2. PV was found in either gender and the ratio of male to female participants was 2.6:1. Their mean age (±S.D.) was 29.14 (±10.52) years and ranged between 18-60 years.

PV was the most prevalent in the age group of 18-30 years. The age group of 50-60 years was the least affected. The chronicity of PV ranged between 17 years and 1 month. The chronicity of 33.6% participants was less than 6 months. We observed that

PV was very common in the lower middle class of the society (47.1%). In our study, the participants were 28.8% students, 21.15% workers, 31.7% employees, 11.5% housewives and 6.7% businessmen.

We found hyperseborrhoea and hyperhidrosis as probable risk factors in 14 participants (13.4%) and 36 participants (34.6%) respectively. The seasonal exacerbation in summer (hot and humid climatic conditions) was reported in 30 participants (28.8%). In this study, 29 participants (27.8%) had a positive family history. PV was observed in Fitzpatrick skin types 2, 3, 4 and 5, but this disease was prevalent in Fitzpatrick skin type 4 (49.03%). The participants of sanguine (51.9%) and phlegmatic (46.1%) temperament were mostly affected. Moreover, diabetes mellitus (13.4%), hypertension (4.8%) and other fungal infection (4.8%) were observed as comorbid clinical conditions in PV.

Table 2 Demographic and epidemiological characteristics of the participants (n=104)

Variables	No. of Participants (%)
Gender	
Male	**75 (72.1)**
Female	**29 (27.8)**
Mean age (S.D.) years	**29.14 (10.52)**
Age group (years)	
18-30	**62 (59.6)**
31-40	**24 (23)**
41-50	**14 (13.4)**
50-60	**4 (3.8)**
Chronicity of Disease	
<6 months	**35 (33.6)**
6 months - 1 year	**27 (25.9)**
2-5 years	**25 (24)**
6-10 years	**13 (12.5)**
11-20 years	**4 (3.8)**
Socio-economic class	
Upper class	**4 (3.8)**
Upper-middle class	**31(29.8)**
Upper lower class	**14 (13.46)**
Lower-middle class	**49 (47.1)**
Lower class	**6 (5.76)**
Profession	
Student	**30 (28.8)**
Worker	**22 (21.15)**
Employee	**33 (31.7)**
Housewife	**12 (11.5)**
Businessman	**7 (6.7)**
Risk factors	
Hyper-seborrhoea	**14 (13.4)**
Hyperhidrosis	**36 (34.6)**
Seasonal exacerbation	
Summer (hot climate)	**30 (28.8)**
Family history	
Positive	**29 (27.8)**
Fitz Patrick skin type	
Type 2	**6 (5.7)**
Type 3	**29 (27.8)**
Type 4	**51 (49.03)**
Type 5	**18 (17.3)**
Co-morbidity	
Diabetes mellitus	**14 (13.4)**
Hypertension	**5 (4.8)**
Other fungal infection	**5 (4.8)**
Temperament	
Sanguine	54 **(51.9)**
Phlegmatic	**48 (46.1)**
Bilious	**2 (1.9)**

In our study, we analysed the clinical and mycological characteristics of the participants. The Table 3 describes the clinical characteristics of the participants enrolled in this study. The newly diagnosed participants were 40.3%**.** The history of recurrence was present in 59.6%. The most common symptom was itching (pruritus) in 44.2% participants. Scaling was present on the surface of the lesion in 79.8%. The primary skin lesion was presented as macule in 82.6% participants. The colour of the lesions was achromic (hypopigmented) in 52 participants (50%), chromic (hyperpigmented) in 27 participants (25.9%) and erythematous in 8 participants (7.6%). Figures 1 and 2 show hypopigmented and hyperpigmented lesions respectively in PV.

We observed the shape of the lesions varied as irregular, oval and circular. The lesions also vary in size, from a pinhead-sized region to large areas.

The margins of the lesions may be defined in most cases. The prevalent pattern of shapes was observed as a mixture of irregular, oval and circular in 33.65%, followed by oval and circular in 28.84% participants. The most common pattern of distribution of the lesions was bilateral asymmetrical in 65 participants (62.5%). The lesions were present at multiple sites in most cases. The back of the participants was most common site involved in 78.84%, followed by neck (70%), chest (64.4%) and arms (34.4%). The body surface area involved between 10 and 30% was reported in 50.9% participants.

Table 3: Clinical characteristics of the participants

Parameters	Variables	No. of Participants (%)
Itching	Present	**46 (44.2)**
Types of lesions	Macules	**86 (82.6)**
	Macules & plaques	**18 (17.3)**
Surface of lesions	Scaling	**83 (79.8)**
	Marks of excoriation	**5 (4.8)**
Occurrence	Newly diagnosed	**42 (40.3)**
	History of recurrence	**62 (59.6)**
Shape of skin lesions	• Irregular • Circular • Oval • Mixed • Circular & Oval • Irregular & Oval • Irregular & circular	**17 (16.34)** **8 (7.69)** **2 (1.92)** **35 (33.65)** **30 (28.84)** **8 (7.69)** **4 (3.84)**
Colour of lesions	• Achromic (hypopigmented) • Chromic (hyperpigmentation) • Erythematous • Mixed types (Hypo/ Hyper/Erythema)	**52(50)** **27 (25.9)** **8 (7.6)** **17 (16.3)**
Multiple Site of lesions	• Neck+ Back+ Chest+ Arms +Axillae • Neck+ Back+ Chest • Back+ Chest • Neck +Back • Neck+ Axillae • Back + Chest+ Axillae • Neck + Chest / Abdomen • Neck + Back+ Axillae • Back+ Arms • Single Site	**25 (24.03)** **22 (21.15)** **10 (9.61)** **8 (7.69)** **7 (6.73)** **6 (5.76)** **6 (5.76)** **5 (4.8)** **3 (2.88)** **12 (11.53)**
Site of lesion	Back Neck Chest Arms & Forearms Axillae Abdomen Face	**82 (78.8)** **73 (70.1)** **67 (64.4)** **38 (36.5)** **24 (23.07)** **21 (20.1)** **11(10.5)**
Distribution of lesions	• Unilateral • Bilateral symmetrical • Bilateral asymmetrical	**10 (9.6)** **29 (27.8)** **65 (62.5)**
Body surface area involved	• <10% • 10-30% • >30%	**8 (7.6)** **53 (50.9)** **43 (41.3)**
Scaling	Fine Scale	**46 (44.2)**
	Scales appear after curettage	**58 (55.7)**

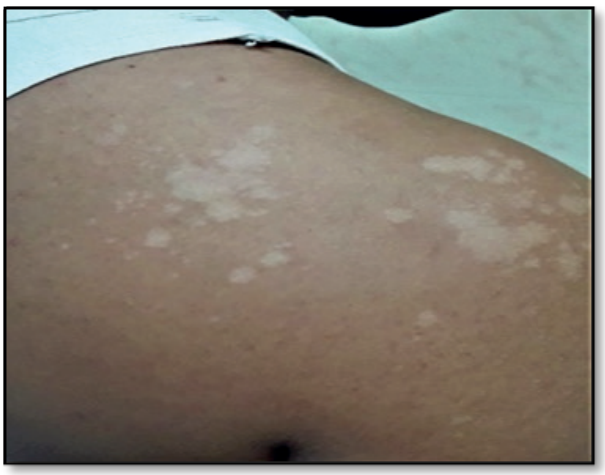

Figure 1 Hypopigmented PV on upper back

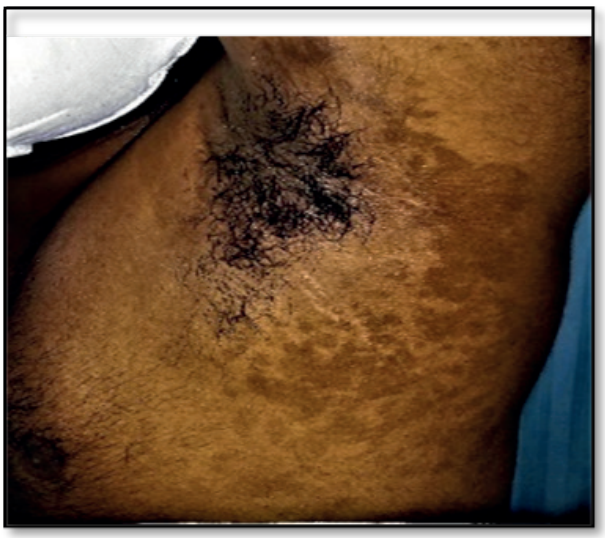

Figure 2 Hyperpigmented PV on axillary area

In our study, we diagnosed the participants clinically and confirmed the diagnosis by direct microscopy of the skin scrapings. We performed direct microscopy of KOH smears prepared by skin scrapings taken from multiple lesions in all cases. We found short hyphae and spores as spaghetti and meatballs appearance or banana and grapes forms. The morphological appearance of the spores and hyphae in direct microscopy has been shown in figures 3a and 3b.

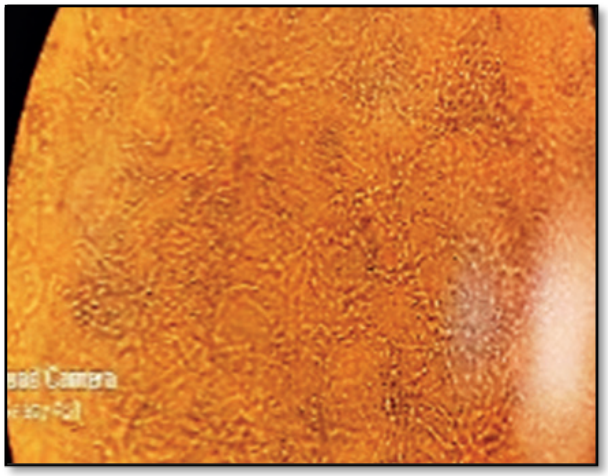

Figure 3 a

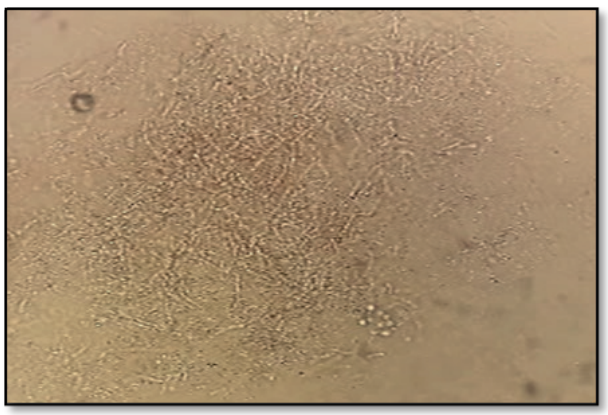

Figure 3 b

Figure: 3 Morphological appearance of *Malassezia* species in direct microscopy (40X magnification) (a) fungal hyphae (b) fungal hyphae and spores

Discussion:

In this study, we analysed the demographic, clinical and epidemiological data of the participants diagnosed with PV who visited the Outpatient Departments of the NRIUMSD, Hyderabad, India. In our study PV was prevalent amongst the male participants. Kambil[22], Rao et al[23], Archana et al[24], Kabbin et al[25]and Jaffer et al[26]also reported the preponderance of male participants in their studies. On the contrary, Kaur et al observed an equal number of male and female participants in their study.[27]

The literature reports that PV has been seen in all age groups and races.[28] But, this study found the prevalence of PV among 18-30 years age group and the average age of the participants was 29.14 (±10.52) years. The similar observation was reported among the participants in the 2nd and 3rd decade of life.[15,29] Sharma et al[8] and Badri et al[30] had also reported similar findings in their studies. The probable causes of higher incidence of PV among 21-30 years age group may be increased sebum production and a high level of physical activity leading to excess sweating which provide a favourable environment for the proliferation of lipophilic yeast to cause PV.[27]

In our study the higher frequency of PV was found in students, workers and farmers. Their profession is associated with the high level of physical activities which increases the activities of sebaceous and sweat glands under the hormonal influence. That's why PV is more common in adolescents and young adults. Ghosh et al[1], Shah et al[31] and Morais et al[12] also found 29.09%, 30.2%, and 37.1% students respectively in their studies. In another study, a higher percentage of PV was also demonstrated in the students followed by housewives.[12,27]

In literature, PV is the most common amongst the lower middle class as per their socioeconomic status. Our study showed the similar findings that 61.67% participants were of lower middle class. Similarly, Ghosh et al found 50% participants of PV in upper lower and lower socioeconomic class.[1] This study demonstrated the chronicity of PV in the range of 17 years and 1 month. But the chronicity of less than one year was seen in the majority of the participants. Krisanty et al demonstrated 72% participants with chronicity between 1 month and 1 year.[16] Snekavalli et al also showed that the duration of the disease had been 1 month to 6 months in 64% participants in their study.[32]

This study determined the Fitzpatrick skin type of the participants. PV was present mainly in the Fitzpatrick skin types 4 (49.03%) and 3 (27.8%). The skin phototyping may be useful in predicting the risk of PV. Ghosh et al found 55.45% patients having medium skin complexion with normal skin texture in their study.[1] On the contrary, another study found no correlation between the pigmentary variations of PV and the skin type.[5]

In this study, the patterns of scales and pigment

in the lesions were also documented. We found multiple achromic/hypopigmented (50%), chromic/ hyperpigmented (25.9%) and erythematous (7.6%) macules. Similarly, Snekavalli[32] (achromic 68%; chromic 23%; mixed 9%), Kabbin et al[25] (achromic 67%; chromic 31%; mixed 2%), Shah et al[31] (achromic 84.1%; chromic 8.6%; mixed 7.1%), Kambil[22] (achromic 44.3%; chromic 31.5%; mixed 24%), Krishnan et al[33] (achromic 84%; chromic 9%; mixed 6%), Ghosh et al[1] (81.8%) and Morais et al[12](62.9%) found hypopigmented macule as the most common presentation in PV. There are several hypotheses to explain the presence of various colours of macules in PV.[5] The damage of melanocytes and inhibition of tyrosinase by dicarboxylic acid (especially azelaic acid) produced by *Malassezia furfur* may cause hypopigmentation.[12] In addition to, the presence of abnormally large melanosomes and hyperaemic inflammatory response in the lesions may cause hyperpigmentation.[3,5]

In this study hyperhidrosis and hyper seborrhoea had been found as probable predisposing factors of PV. Kambil and Jena et al also observed similar findings.[10,22] The hot and humid climates induces increased sweating which provides favourable conditions for lipophilic yeast to grow resulting in higher incidence of PV in temperate region.

In our study, 26.6% participants had positive family history. Similarly, Ghosh et al, Hafez et al, Rao et al, Jaffer et al and Kambil had reported positive family history in cases of PV.[1,22,23,26] It may be explained that hereditary factors play an important role in the transmission of PV.[2]

The literature says that recurrence of PV is a common phenomenon. Our study found history of recurrence in 57.6% participants. There were 40.3% newly diagnosed participants. The similar observations were reported in other published studies.[1,12,22] Seasonal predisposition in summer season is observed in PV cases.[8] In our study, 28.8% participants had reported the symptoms of PV in summer**.** Dutta et al[1] and Rao et al[23] revealed the similar observations in their studies. But, Jena et al showed an increased incidence of PV during the summer as well as monsoon season.[10]

Nonetheless, our study found macules in 82.6% and macules with plaques in 17.3% participants. Ghosh et al, Rao et al and krishnan et al reported the similar observations.[1,23,33]

We also found the prevalence of the lesions on the upper body trunk was significantly more than that of other anatomical regions of the body. In our study, back (78.8%) was the most common site followed by neck (70.1%) and chest (64.4%). The increase frequency of involvement of back, neck and chest may be due to the increase sebaceous gland in these areas.[5]Ghosh et al showed involvement of chest in 48.18% as the commonest site whereas Kambil observed back as commonest site (46%).[1,22]

In addition to, we documented the quantum of body surface area involved in PV cases. We found 50.9% participants had lesions in between 10% and 30% body surface area. Our study also showed that 79.8 % participants had scales in the surface of the lesions. Rao et al showed scales in 75% participants but Ghosh et al found scales in 89. 09% participants in their studies.[1,23]

Pityriasis versicolor may be generally asymptomatic. Mild pruritus may be present in some cases.[3] We noted mild pruritus in 44.2% cases. But Snekavalli et al[32] showed pruritus in 32% and Rao et al[23] in 30% participants. Kaushik et al[21]and Morais et al[12] found pruritus in 22% and 48.3% respectively.

PV has been associated variably with systemic diseases in various studies. The present study demonstrated co-morbid conditions such as diabetes mellitus in 13.4%, hypertension in 4.8% and other fungal infection in 4.8%. But Krishnan et al showed no association of PV with diabetes mellitus and other immunosuppressive disorders.[33] Ghosh et al demonstrated diabetes mellitus in 2.73% and lymphoproliferative malignancy in 1%.[1] Another study showed diabetes mellitus in 39.3% and hypertension in 25% of the participants.[22]

We observed that PV was common in phlegmatic and sanguine participants. On the contrary, the literature says that PV is common among individuals with phlegmatic and melancholic temperaments.[34] The determination of temperament of the participant may provide a clue in the identification of etiological factors as per the humoural concept of the Unani System of Medicine and help in treatment strategy.[34] *Malassezia* species requires certain factors that favour its proliferation such as endogenous, exogenous, environmental, genetic and immunological factors. Dystemperament may also be one of the predisposing factors for PV.

The causative organism *Malassezia* species readily be identified by treating skin scraping with 10% KOH.[1,22] So far, 14 *Malassezia* species have been

identified taxonomically. Of them, seven species may cause PV.[24] M. *globosa* and M. *sympodialis* and M. *furfur* are mainly responsible for PV.[3] In the present study, we found the presence of *Malassezia* species in the lesions of all cases. The morphological appearance of the organism as short hyphae and variously sized spores as spaghetti and meatballs appearance on direct microscopy confirmed its presence in the lesions.

This was a hospital-based descriptive cross-sectional study. This study had certain limitations. The sample size of this study was small. The age group of participants enrolled into this study was restricted. The culture and molecular analysis of *Malassezia* microflora have not been done to identify different *Malassezia* species and correlate them with the disease.

This study determines the demographic, clinical, epidemiological and mycological profile of PV at a national institute. This study provides atypical and typical clinical presentations of PV in clinical practice in Southern India. Overall, these updates of clinico-epidemiological profile of PV have importance for general medical practitioners, dermatologists, academicians and researchers. This study provides an understanding of the clinical course of the disease, predisposing factors and association with other systemic diseases.

Conclusion:

This study concludes that PV has preponderance in adult males in the age group of 20-30 years. Genetic predisposition, hyperhidrosis, hot and humid climate and personal hygiene are the predisposing risk factors. We found *Malassezia* species in the hypopigmented and hyperpigmented lesions as the causative organism. The outcome of the study has multidimensional significance and it may suggest preventive measures such as promoting personal hygiene, daily bathing, avoiding excessive sweating, etc to control and treat PV. This study gives an account of clinico-epidemiological profiles of PV in this geographical region which may help the physicians in the clinical diagnosis and treatment strategy of PV. Since this study was hospital-based, community-based studies with larger sample sizes are needed to find out the actual burden of PV in our community.

Conflict of Interest: None

Authors Contributions: BAI and MN conceptualized the idea, designed the study and developed protocol. BAI, MN and SHF gathered the data. MN edited and submitted the manuscript. BAI, MN and SHF approved the final draft of the manuscript.

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