



RESEARCH ARTICLE

# Magnitude and associated factors of Pityriasis Versicolor among patients attending Dermatovenereology Outpatient Department at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia

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## ABSTRACT

Pityriasis versicolor (PV) is a chronic superficial fungal infection caused by *Malassezia* species. It is the most common dermatologic disorder in tropical countries including Ethiopia and skin discoloration is the principal morbidity resulting from pityriasis versicolor. Therefore, this study assess the prevalence and associated factors of PV among patients attending Dermatovenereology clinic at the University of Gondar Comprehensive Specialized Hospital. Hospital based cross sectional study design was employed. Systematic random sampling was used and a total of 406 participants who attended Dermatovenereology OPD were included in the study. Data were collected by interview and physical examination. Then it was checked, coded, entered into Epi-Info version 7 and analyzed using Stata version 14. Both bivariable and multivariable logistic regression were employed to identify factors associated with PV. Adjusted odds ratio with their corresponding 95% CI and P-value were calculated. A P-value less than 0.05 was used to declare statistically significant variables. The overall magnitude of PV among patients attending Dermatovenereology OPD at the UGCSH was 12.6% (95%CI; 9.2%, 15.0%). Those who had a diploma and above education [AOR: 95% CI; 4.67 (1.18, 18.47)], excessive sweating [AOR: 95% CI; 4.75 (1.92, 8.76)] being male [AOR: 95%CI; 4.19 (1.92, 9.14)], practicing regular exercise [AOR: 95% CI; 4.11 (1.93, 8.76)] and wearing heavy clothes [AOR: 95% CI; 2.53 (1.24, 5.15)] were found to be statistically significantly associated with PV. This study found that the magnitude of Pityriasis versicolor was relatively lower. The study revealed that educational status (diploma and above), male gender, habit of regular exercise, excessive sweating and wearing heavy cloths were significantly associated with Pityriasis Versicolor. It is recommended that high risk patients receive close follow up and health professionals should provide health education sessions in waiting rooms about the identified risk factors.

Keywords: Pityriasis versicolor, associated factor, Gondar, Northwest Ethiopia.

## INTRODUCTION

Pityriasis versicolor (PV) is a chronic superficial fungal infection caused by *Malassezia* species, predominantly by *M. globosa* and *M. Furfur* which reside as skin commensal on stratum corneum layer of the skin. The occurrence of clinical disease by *Malassezia* needs predisposing factors permitting the conversion of saprophytic yeast form to the mycelia form (2, 3). It is sometimes called 'tinea versicolor'. Also named as dermatomycosis furfuracea, chromophytosis, tinea flava and liver spot (4).

Clinical manifestation of Pityriasis versicolor could be asymptomatic to mildly itchy patches and thin plaques with partly covered by fine branny scale on different parts of the body mainly prefer the neck, chest and back, upper arms, and, infrequently affects the scalp, abdomen, and groin

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region. The name “versicolor” denotes to the range of skin color variations that patients with PV would present including hypopigmentation and hyperpigmentation also erythematous to salmon-colored skin rash (8). In general, P.V is responsible for hypopigmented lesions in individuals with dark skin and hyperpigmented lesions in persons with white skin (9).

Tinea versicolor distributed worldwide, predominantly in tropical countries. Infection by Tinea versicolor usually affects persons at adult age group owing to increase sebum secretion after puberty. A 30–40% prevalence of PV had been reported in tropical areas worldwide (3). The prevalence of PV is dissimilar among different countries for instance in South America 50%, Egypt 11.6%, and Ethiopia 6.1% (6, 7).

A significant rise in disease prevalence between childhood and adolescence had been reported and it may be due to hormonal changes that increase sebum production and this lipid-rich environment prefers fungal growth (8). In both tropical and temperate regions PV is infrequent in childhood and it becomes common in the late teens, with a peak incidence in the early twenties (5). Role of sex as a predisposing factor to the development of T.versicolor is still uncertain. Some studies reported as PV is more common in men than women, on the contrary other studies indicated that the incidence of PV is higher in women (9).

Skin discoloration is the principal morbidity results from PV and this adverse cosmetic effect of lesions may lead to substantial emotional distress, particularly in adolescents. Tinea versicolor frequently recurs despite adequate initial therapy. Even with adequate therapy, residual pigmentary changes may take several weeks to resolve (9). Recurrence rate of Malassezia infection is high, approximately 60% in first year and 80% in the second year. If the disease is left untreated, it may be complicated to invasive fungal infections (10).

Pityriasis versicolor is the most common dermatologic disorder in tropical countries including Ethiopia. This study is first in kind in the study area and few studies had been done on the prevalence of PV and its associated factors in Ethiopia. For instance a study carried out on prevalence of dermatophytes and non-dermatophytes fungal infection at Tikur Anbessa hospital, Addis Ababa, Ethiopia, 2014, showed high prevalence of fungal infection which was 79.3% among study participants but the study lacks to incorporate any associated factors to fungal infections including PV (11). This study will provide the magnitude and associated factors of PV among patients attending Dermatovenereology OPD clinic at the University of Gondar Comprehensive Specialized Hospital to advance the quality of health service provided for Dermatovenereology patients.

## MATERIALS AND METHODS

### Study area and period

The study was conducted among patients who visit Dermatovenereology OPD for any skin disorders at the UGCSH located in Gondar town, Northwest Ethiopia. Gondar town is zonal city of central Gondar, which is located at 742 km far from Addis Ababa. The hospital serves as a referral hospital for a catchment area of above 7 million people. Department of Dermatovenereology, started residency program in Dermatovenereology with three Dermatovenereologist since 2019 and offers Dermatovenereologic OPD and inpatient services for the community.

Hospital based cross sectional study was employed among patients who visit Dermatovenereology OPD at the UGCSH from May to July /2022.

### Source and study Population

All patients attended Dermatovenereologic OPD at University of Gondar Comprehensive Specialized Hospital. Patients attended the Dermatovenereologic OPD at University of Gondar Comprehensive Specialized Hospital during study period.

### Inclusion and exclusion criteria

Patients attended the Dermatovenereologic OPD at University of Gondar Comprehensive Specialized Hospital and whose age is 15 year and above were included in this study.

Patients with ambiguous diagnosis with extensive desquamation, inflammation, wounds or abscesses associated with skin lesions.

### Sample size determination and sampling procedures

Considering the prevalence of PV as 40% from a study conducted in (30), a sample of 406 patients (using single population proportion sample size calculation formula for cross sectional study) will be included in this research project with the following assumptions: an assumed 40% prevalence of PV among Dermatovenereology OPD patients; a confidence level of 95%; a marginal error of 5%.

Systematic random sampling was employed to select study units from patients attending dermatologic OPD until sample size is achieved. In average 20 patients visit each day from Monday up to Friday working hours at Dermatologic OPD of the hospital. Last year within two months period (February & March), a total of 940 patients were seeking treatment for different skin disorders.  $K\text{-value} = \frac{\text{patient no. within study period}}{\text{total sample size}} = \frac{940}{387} = 2.4 = 2$ . In this study we included every 2<sup>nd</sup> patient coming to dermatology OPDs. Then the selected patients were interviewed (history), and also clinical examination (Physical examination) was conducted.

### Data collection procedures

Data was collected by 5- general practitioners after orientation is given on how to document relevant information on the questionnaire related to the study. All selected patients by systematic random sampling were interviewed using structured questionnaire and physical examination was undertaken and documented. Training was given to the data collectors and pre-test was done before the data collection period in 5% of clients attended in dermatology OPD. In addition, data collection procedure was supervised by principal investigator and any error can be corrected on time.

### Data processing and analysis

The data were checked for the completeness and entered into the Epi-info version 7 software package. Then, it was exported to Stata version 14 statistical software for cleaning, coding and analysis. Descriptive and analytic statistics were calculated. The descriptive statistics were described using frequency, percentage, mean and standard deviation by figure, table and text. Crude and adjusted odds ratio with the corresponding confidence interval and P-value were computed using bivariable and multi variable

logistic regression, respectively. All explanatory variables in bivariable analysis with P-value of 0.25 and less than were considered candidate variables for multivariable analysis to control confounding factors. The model fitness was assessed using Hosmer and Lemeshow's goodness of fit test. A p-value less than 0.05 was used to report statistically significant variables in this study.

### Ethical clearance

Ethical clearance was obtained from the institutional review board of University of Gondar, College of Medicine and Health Sciences and permission was obtained from the department of Dermatovenereology. Assent for patients under 18-year and consent for those above 18-year was taken from all study participants and parents (guardians). They were adequately informed with regard to the aim and important of the study along with their right to refuse for participation before proceeding with the questions. Confidentiality was maintained and assured by excluding their names from respondent identification of the study subjects.

## RESULT OF STUDY

### Socio-demographic characteristics

A total of 398 respondents were participated in this study with a response rate of 98.03%. The mean age of respondents was 33.66 (SD  $\pm$  15.51) years. More than half of respondents 207(52.01%) were male. Among the total respondents 190(47.74%) were married and 15 (3.77%) were widowed.

Regarding to educational status, 114(28.64%) respondents had educational status of diploma and above and 71(17.84%) had no education. Nearly 43% of respondents were employed and 59 (14.82%) were unemployed. With regard to residence of respondents, 326 (81.91%) were lived in warm and humid environment and 72 (18.09%) in cold & dry weather condition.

### Clinical characteristics

Among the 398 respondents of the study, 50 (12.56%) respondents had Pityriasis Versicolor on physical examination and 27 (54%) of them had history of treatment for their skin lesion. In the study, 17 (34.0%) of respondents with Pityriasis Versicolor had the same problem in their families. Among respondents with Pityriasis Versicolor, 27 (54.00%) had Itchy / pruritic skin rash.

Nearly 17 (4.27%) of respondents were recently used drugs for other medical disorders. Out of the total 398 study respondents 181(45.48%) had habit of doing exercise regularly, 129(32.41%) had history of excessive sweating, 152(38.19%) wore heavy cloths and 126(31.66%) of them had using cosmetics on their body.

Regarding the color of the lesion, hypo-pigmented lesions prevail and it accounted 29(58%). A mixed (hypo- and hyper-pigmented) lesion was seen in 11 (22%) of respondents with Pityriasis Versicolor, and the other 10 (20%) had hyper-pigmented lesions.

The primary morphology of skin lesion of 24(48%) respondents was macular and 24 (48%) \*were plaques lesions and the remaining 2(4%) were mixed macular and plaque lesions. In more than half (52.0%) of respondents' cases, lesions are located in multiple anatomical locations, which describes the involvement of two and more regions.

Trunk involvement account 13(26%), neck 9(28%), and head/face 2 (4%). Among the total respondents, 12 (3.02 %) had chronic illness and pregnancy.

**Table 1.**  
**Socio-demographic characteristics of study participants**

Variables	Frequency	Percentage (%)
Gender		
Male	207	52.01
Female	191	47.99
Age		
15-20	68	17.09
21-30	161	40.45
31-40	67	16.83
>=41	102	25.63
Residence		
Urban	285	71.61
Rural	113	28.39
Religion		
Orthodox	366	91.96
Muslim	23	5.78
Others	9	2.26
Marital status		
Single	176	44.22
Married	190	47.74
Divorced	17	4.27
Widowed	15	3.77
Educational status		
No education	71	17.84
Primary school	101	25.38
Secondary school	95	23.87
Diploma & above	114	28.64
Non- formal education	17	4.27
Occupational status		
Student	82	20.60
Unemployed	59	14.82
Employed	170	42.71
Farmer	87	21.86
Income		
<1000	3	0.75
1001-2000	134	33.67
2001-3000	80	20.10
>3000	181	45.48
Weather condition		
Warm & humid	326	81.91
Cold & dry	72	18.09
NB:		
– Non-formal education- education in religious institutions, kebele (can read & write)		
– No education- means patients that cannot read and write		

### Factors associated with Pityriasis Versicolor

Binary logistics regression was employed to evaluate the association between different socio-demographic and clinical related variables with Pityriasis Versicolor. Variables with a P-value < 0.25 in the bivariable analysis were considered candidates for multivariable analysis. Accordingly, age, gender, educational status, income level, habit of exercise regularly, sweating excessively, wearing heavy cloths.

Model fitness was checked using the Hosmer and Lemeshow test and its adequacy was confirmed as 0.23. In the final multivariable logistic regression analysis: educational status (diploma and above), male gender, habit of exercise regularly, sweating excessively and wearing heavy cloths were significantly associated with Pityriasis Versicolor.

**Table 2.** Personal and clinical characteristics of study participants at the UGCSH, Dermatovenereology OPD, Northwest Ethiopia (n=398)

Variables		Frequency	Percentage (%)
P.versicolor on physical examination	Yes	50	12.56
	No	348	87.44
Itchy / pruritic skin rash	Yes	27	54.00
	No	23	46.00
Duration of skin rash	< 1 year	26	52.00
	1-2 years	11	22.00
	>2 years	13	26.00
Episode of rash	First	20	40.00
	Recurrent	30	60.00
Recurrence per year	2-3	27	90.00
	>= 4	3	10.00
Treatment history for skin rash	Yes	27	54.00
	No	23	46.00
Similar problem in the family	Yes	17	34.00
	No	33	66.00
Habit of exercise regularly	Yes	181	45.48
	No	217	54.52
Sweat excessively	Yes	129	32.41
	No	269	67.59
Wearing heavy (thick) cloths	Yes	152	38.19
	No	246	61.81
Cosmetics use (moisturizer)	Yes	126	31.66
	No	272	68.34
Known chronic illness & pregnancy*	Yes	12	3.02
	No	386	96.98
Recently used drugs for other medical disorders**	Yes	17	4.27
	No	381	98.73
Color of the skin lesion	Hypo-pigmented	29	58.00
	Hyper-pigmented	10	20.00
	Mixed	11	22.00
Primary morphology of skin lesion	Macule/patch	24	48.00
	Plaques	24	48.00
	mixed	2	4.00
Distribution of skin lesion	Head/face	2	4.00
	Neck	9	18.00
	Trunk	13	26.00
	Multiple region	26	52.00

\* Tuberculosis, Diabetes mellitus, HIV/AIDS, malnutrition, pregnancy \*\*OCP, Steroid, broad spectrum antibiotics

**Table 3.** Bivariable and multivariable logistic regression analysis for factors affecting Pityriasis Versicolor among patients attending Dermatovenereology OPD at UGCSH, Northwest Ethiopia (n=398)

Variables	P. versicolor		COR (95%CI)	AOR (95%CI)	
	Yes	No			
Age	15-20	8	60	3.27(0.94,11.31)	2.13(0.50,8.98)
	21-30	30	131	5.61(1.91,16.44)	2.81(0.79,10.04)
	31-40	8	59	3.32(0.96,11.51)	2.61(0.65,10.35)
	>=41	4	98	1	1
Gender	Male	39	168	3.79(1.88,7.66)	<b>4.19(1.92,9.14)***</b>
	Female	11	180	1	1
Educational status	No education	4	84	1	1
	Primary school	9	92	2.05(0.61,6.91)	2.13(0.53,8.61)
	Secondary school	14	81	3.63(1.15,11.49)	2.79(0.71,10.99)
	Diploma & above	23	91	5.31(1.76,15.98)	<b>4.67(1.18,18.47)*</b>
Habit of exercise regularly	Yes	38	143	4.54(2.29,8.99)	<b>4.11(1.93,8.76)***</b>
	No	12	205	1	1
Sweating excessively	Yes	34	95	5.66(2.98,10.72)	<b>4.75(1.92,8.76)***</b>
	No	16	253	1	1
Wearing heavy cloths	Yes	28	124	2.29(1.26,4.18)	<b>2.53(1.24,5.15)*</b>
	No	22	224	1	1

\*significant at P <0.05 \*\* significant at P < 0.01 \*\*\* significant at P <0.001

Those who had a diploma and above were 4.67 (AOR = 4.67, 95%CI: 1.18, 18.47) times more likely to have Pityriasis Versicolor than those who had no education. The odds of experiencing Pityriasis Versicolor among male patients were 4.19(AOR = 4.19, 95%CI: 1.92, 9.14) times higher than female patients. The odds of experiencing Pityriasis Versicolor among patients practicing regular exercise were 4.11 (AOR = 4.11; 95%CI: 1.93, 8.76) times higher than their

## DISCUSSION

This study was conducted to determine the magnitude and to identify factors associated with Pityriasis Versicolor among patients attending Dermatovenereology Outpatient Department at the UGCSH, Northwest Ethiopia. The study identified that the prevalence of Pityriasis Versicolor was 12.6% (95%CI: 9.2%, 15.0%).

In this study, the finding of the magnitude of Pityriasis Versicolor is consistent with a study conducted in Cote d'Ivoire, in which the prevalence Pityriasis Versicolor was 12.6% (36), in central Africa republic 16.6% (25), and in Malawi 16.9%(37). However, this result was higher than the studies conducted in Sweden 0.8% (14), Madras, India 2.98% (38), and Nigeria 6.7% (39). On the other hand, this study had lower prevalence than studies done in Mekelle, Ethiopia 24.6% (2), Egypt 44%(41), and Brazil 40% (42). A variation in weather conditions, such as high humidity and extreme heat (39), and difference in outcome variable measurement may explain the observed difference. For instance, some studies used laboratory tests to diagnose Pityriasis Versicolor, while our study used only patient history and physical examination to diagnose Pityriasis Versicolor, and differences in sociodemographic characteristics of study participants could also play a role.

The current study finding revealed that educational status (diploma and above), male gender, habit of exercise regularly, sweating excessively and wearing heavy clothes were significantly associated with Pityriasis Versicolor.

This finding showed that those who had a diploma and above were four times more likely to have Pityriasis Versicolor than those who had no education. These finding is supported with that of another studies conducted in Mekelle, Ethiopia (2), Cote d'Ivoire (36) and Brazil(43). The possible explanation could be that those individuals who had a diploma and above may have had a different lifestyle than those who had no education i.e. mostly they took care of their skin by applying different cosmetics to their bodies, which enhances occlusion and the occurrence of the disease (2).

Our study revealed that the odds of experiencing Pityriasis Versicolor among male patients were four times higher than female patients. Similarly studies conducted in central Africa (25), Egypt (44) and India (38) showed that being male significantly associated with Pityriasis Versicolor. In contrast, study conducted in Cote d'Ivoire showed that being female significantly associated with Pityriasis Versicolor (36). The possible explanation could be it is generally well known that women had greater aesthetic concern than men, leading them to consult dermatologists more (45) and female use cosmetic products for hydration or depigmentation purposes (36).

In this study, the odds of experiencing Pityriasis Versicolor among patients practicing regular exercise were four times higher than their counterparts. This finding is supported with a study conducted in Mekelle, Ethiopia (2) and Turkey (46). The possible justification might be having regular physical exercise and participating in different

counterparts. Those who had excessive sweating were 4.75 (AOR = 4.75, 95%CI: 1.92, 8.76) times more likely to have Pityriasis Versicolor than those who did not have excessive sweating. The odds of experiencing Pityriasis Versicolor among patients wearing heavy clothes were 2.53(AOR = 2.53; 95%CI: 1.24, 5.15) times higher than their counterparts.

sports may ensure the physical appearance or good posture of the individual; however, if the individual does not take a shower after doing regular exercise, this may create conducive environment for the normal flora of yeast to change into a disease-forming form along with visible lesions that may result from unhygienic conditions (30).

This study showed that those who had excessive sweating were four times more likely to have Pityriasis Versicolor than those who did not have excessive sweating. Similarly, studies conducted in Mekelle Ethiopia (2), India (47), Italy (48) and USA had consistent finding (49). The possible justification could be that human sweat contain nutrients that create favorable environment for the growth of Pityriasis Versicolor etiology agent (50). This implies that individuals should take a shower if excessive sweating occurs.

Our study revealed that the odds of experiencing Pityriasis Versicolor among patients wearing heavy clothes were two times higher than their counterparts. This finding is supported by a study conducted in Mekelle Ethiopia (2) and USA (49). It might be that occlusion from talcum powder or synthetic clothing leads to increased carbon dioxide concentrations, altered micro flora, and altered pH, and this might be one factor that leads to Pityriasis Versicolor development (51).

## STRENGTH AND LIMITATIONS OF THE STUDY

Short and precise interviewer administered questionnaires were used to reduce bias. With regard to limitations, in the present study, a cross-sectional study design was used. Cross-sectional studies may not be able to distinguish between outcome and risk factor in order to determine which comes first. Recall bias can also occur if risk factors are forgotten. Patients with P. versicolor were clinically diagnosed but not confirmed with laboratory investigations.

## CONCLUSION

This study found that the magnitude of Pityriasis versicolor was relatively lower than a study conducted in tropical regions. The current study finding revealed that male gender, educational status (diploma and above), habit of exercise regularly, sweating excessively and wearing heavy cloths were significantly associated with Pityriasis Versicolor.

## DECLARATIONS

### Consent For Publication

I fully agree that this thesis can be published for academic purposes and I am ready to provide support and additional information needed to facilitate the publication process.

### Availability Of Data And Material (ADM)

All of the data and materials used in this research have been collected well and are available for those who need them, both for academic purposes and further research.

### Competing Interests

The authors declare no conflict of interest.

### Funding

In this research process, the researcher used personal funds to support the continuity of the research.

### Authors' Contributions

The author's contributions to this research include planning, data collection, analysis, and report writing. All of these contributions would not have been possible without the support of the parties who have assisted in the research process.

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