Original Article

Prevalence and Pattern of Skin Diseases in Tribal Villages of Gujarat: A Teledermatology Approach

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Abstract

Background: The prevalence and pattern of skin diseases are influenced by the overall ecosystem of the region. There is a dearth of research about prevalence, health-care seeking, compliance, and treatment outcome in skin diseases among scheduled tribes. **Objectives:** The aim of this study is to understand the magnitude of skin diseases in tribal area of Dahod, Gujarat using a simple "Store and Forward" technique of teledermatology. **Materials and Methods:** A cross-sectional study was conducted in 10 randomly selected villages of Dahod and Jhalod blocks of Dahod district of Gujarat during June–August 2017. Trained surveyors visited households randomly in different localities (called Faliya) of each village ensuring representativeness. Survey responses were captured on mobile-based MAGPI portal, and images of skin conditions were capture on smart phones, and de-identified images were transferred over WhatsApp. **Results:** A total of 781 households were approached in 10 villages and 2214 participants consented. Among them, 549 were identified with suspected skin diseases, but 520 consented for photograph. The skin diseases were more prevalent among males, children, and elderly. Of 520, 44 (8.5%) could not be assess due to poor quality photograph and 35 (6.7%) did not have any clinically significant condition. Thus, of 2214 participants, 441 (20%) had skin diseases, and infections and eczema were major conditions constituting two-third of the skin diseases in the study population. The treatment-seeking behavior and compliance to treatment was poor. **Conclusion:** Considering the high prevalence of skin diseases in tribal villages of Dahod, Gujarat coupled with limited availability of trained dermatologist, new innovative avenues like teledermatology should be explored.

Keywords: Epidemiology, prevalence, skin diseases, teledermatology, tribal

Introduction

Skin is the largest organ of human body. The prevalence and pattern of skin diseases are influenced by the overall ecosystem of the region including sociocultural milieu, topography, nutrition, genetics, etc.[1] There have been some attempts of profiling skin diseases through hospital-based studies.[2-4] The prevalence of skin diseases was reported a bit low in hospital settings[1-5] as compared to community-level medical camps.[6,7] It varies from 4.2% to 11.6% in the general population. However, the prevalence is reported quite high (30%–40%) in pediatric population.[6,8] Surprisingly, a recent community-based survey in the central India reported very high prevalence (60%) of skin diseases.[9]

The prevention and management of skin diseases received less attention in the past decades due to low mortality rates. However, a recent Global Burden of Disease Study finding revealed that skin diseases rank 18 in top 20 diseases in terms of Disease Adjusted Life Years (DALYs) and is fourth leading cause of nonfatal disease burden.[10] Skin diseases contributed about 2% of the global burden of diseases measured in DALYs.[11] Further, skin diseases increase clinical depression and anxiety as well as suicidal ideation.[12]

In general, skin diseases require long-term treatment and the treatment is costly. In a developing country like India, treatment seeking and treatment compliance are marred by poor

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health-care delivery system and catastrophic out-of-pocket health expenditure.[13]

Appropriate management of skin diseases requires accurate diagnosis by primary physician. Regrettably, the evidence indicates incompetency of primary physicians in diagnosing skin diseases accurately.[14] Innovative approaches are required for effective identification and management of skin diseases. Teledermatology is simply dermatologic care through Information and Communication Technology.[15] Although it can be expanded to research, evaluation and education as well.[16] The advantages of teledermatology are reported unequivocally with respect to reliability, accuracy, accessibility as well as cost reduction.[15-17]

The state of Gujarat has about 15% tribal population[18] and most tribal areas are categorized as "high priority" from healthcare perspective by the state government. While "high priority" categorization could be attributed to lagging maternal and child health indicators compared to nontribal areas, epidemiological studies are called for to understand magnitude of illnesses, health-care seeking, medication adherence, and treatment outcome among scheduled tribes. Tribal population has some pros and cons with respect to skin diseases. On one hand, the population is protected against industrial pollutants and overcrowded housing. On the other hand, lack of hygiene and sanitation and poor access to healthcare, especially specialty services increase the risk of skin diseases.

The study was carried out to understand the magnitude of skin diseases in tribal villages of Dahod, Gujarat and identify population subgroups that need targeted interventions.

Materials and Methods

A community-based cross-sectional study was conducted in 10 randomly selected villages of Dahod and Jhalod blocks of Dahod district of Gujarat, India during June–August 2017. A list of villages within 20 km periphery from Dahod city in Dahod and Jhalod blocks was prepared. Ten villages from these two blocks were selected randomly by computer generated random numbers using WINPEPI software (Developed by Professor Joe Abramson available at http://www.brixtonhealth.com/pepi4windows.html). Field surveyors were trained by experienced dermatologist of a tertiary care teaching hospital. The surveyors consisted three qualified social workers and three female nurses. The training consisted of technical competencies, namely identifying basic primary skin lesions, capturing good quality photographs of suspected lesions (background selection, close up, adjusting angle etc.). This was followed by training in administrative competencies, namely explaining the study, seeking consent for data and photographs, and transferring de-identified survey data and photographs.

Surveyors visited few households randomly in different residential clusters (called Faliya) of each village ensuring representativeness of the sample. Every member present in the household, regardless of their age (except children <5 years of age) and sex, and belonging to the family were explained about the study and consent was sought. Written informed consent for screening as well as photographs of skin condition (s) was obtained from each family member as applicable. As the survey was conducted in the morning and afternoon hours, most of the children were attending the schools. Hence, four schools surrounding study villages were visited by the surveyors to include these children in the study.

The study was performed using "Store and Forward" technique of teledermatology. A structured questionnaire was developed by investigators in a vernacular language and responses were recorded on mobile-based MAGPI portal, which also allows offline data collection. Questionnaire consisted sociodemographic details, details of general physical examination, known medical history of skin conditions (including recurrence), treatment (s) undergone/ongoing, and medication adherence.

On consent, survey questionnaire was filled and general physical examination was carried for diagnosing probable skin condition (s). If medical history or physical examination revealed any skin lesion/condition, picture of probable skin condition (s) was captured by field surveyor using their smartphones.

De-identified pictures along with individual's study identification number were then transmitted through WhatsApp to research coordinator and consultant dermatologist. Skin conditions were diagnosed and reported by dermatologist at a tertiary care teaching hospital, situated about 200 km from the study villages. The diagnosis was entirely based on clinical observation of pictures transmitted through WhatsApp, and no clinical assessment or dermatological investigations were performed by a dermatologist. Classification and grouping of skin conditions for the purpose of this study were done by consultant dermatologist. The participants with skin diseases were provided with the diagnosis and referred to the primary health center/community health center for further management.

Sample size

The aim of the study was to estimate the prevalence and pattern of skin diseases in the tribal population and hence, sufficiently large sample size was required to get stable estimates of the parameters. In the absence of any background study in this tribal region, we assumed 50% prevalence of skin diseases. To estimate a proportion of 50%, a random sample of 385 was required with 95% confidence level and 5% acceptable difference. However, considering feasibility, 10 villages were selected randomly to ensure representativeness and the stability of estimates even in subgroup analysis. A total sample size was expected to be about 2000.

The study was approved by the Institutional Ethics Committee.

Statistical analysis

Data were retrieved and exported from admin panel of MAGPI in Excel sheet format and transformed into statistical software

STATA (version 14.2, Stata Corporation, Texas, USA). Descriptive statistics (frequency [%]) was used to assess the prevalence of skin diseases. Chi-square test was performed to evaluate differences in the prevalence and pattern of skin diseases among different population subgroups. A value of $P = 0.05$ was considered statistically significant.

Results

A community-based clinical skin examination was conducted in 781 households of 10 villages in Dahod district. Of 2256 participants approached, 2214 (98.1%) consented and participated in the study. Of 2214 participants, 549 were identified with suspected skin diseases and only 520 (94.7%) consented for photographs. Most of the participants were below 40 years of age, illiterate and below poverty line. The gender distribution was similar. The skin diseases were more prevalent in males as compared to females. The prevalence was more in pediatric age group as well as older age groups [Table 1].

Of 520 identified as suspected cases by the surveyors, 35 (6.7%) did not have any significant skin disease, whereas the dermatologist could not opine about the skin disease in 44 (8.5%) cases due to poor quality of photographs. Thus, of 2214 participants, 441 (20%) had skin diseases as confirmed by consultant dermatologist. Infections and eczema were

Table 1: Profile of study participants and suspected cases

Variable	Overall frequency (%) (*n*=2214)	Suspected frequency (%) (*n*=520)*	*P*
Age (years)			
<18	766 (34.6)	196 (25.6)	<0.001
19–40	810 (36.6)	133 (16.4)	
41–60	467 (21.1)	127 (27.2)	
>60	171 (7.7)	64 (37.4)	
Sex			
Male	1021 (46.1)	282 (27.6)	<0.001
Female	1193 (53.9)	238 (20)	
Education†			
No schooling	900 (40.7)	226 (25.1)	0.32
Primary	686 (31)	155 (22.6)	
Secondary/higher secondary	556 (25.1)	121 (21.8)	
Diploma	37 (1.7)	9 (24.3)	
Graduate	31 (1.4)	8 (25.8)	
Postgraduate	4 (0.3)	1 (25)	
Socioeconomic status‡			
Above poverty line	382 (17.3)	84 (22)	0.45
Below poverty line	1795 (81.1)	427 (23.8)	
Not known	37 (1.7)	9 (24.3)	

*Percentage was calculated based on overall frequency in that category, †The categories were collapsed into no schooling, primary and secondary/higher secondary/diploma/graduate/postgraduate for calculating *P* value, ‡The category "Not known" was not included for calculating *P* value

Table 2: Pattern of skin diseases in Dahod

Variable	*n*	Category	Frequency (%)
Skin disease	520	Infection	142 (27.3)
		Eczema	175 (33.7)
		Papulosquamous	31 (6)
		Pigmentry	29 (5.6)
		Unclassified	64 (12.3)
		Undiagnosed	79 (15.2)
Infection	142	Viral	3 (2.1)
		Warts	3 (2.1)
		Bacterial	47 (33.1)
		Furuncle	2 (1.4)
		Impetigo	22 (15.5)
		Periporitis	2 (1.4)
		Pyoderma	20 (14.1)
		Folliculitis	1 (0.7)
		Fungal	90 (63.4)
		Dermatophytoses	56 (39.4)
		Tinea versicolor	33 (23.2)
		Onychomycosis	1 (0.7)
		Parasitic	2 (1.4)
		Scabies	2 (1.4)
Eczema	175	Acute Eczema	1 (0.6)
		Sub-acute Eczema	5 (2.9)
		Chronic Eczema	126 (72)
		Exogeneous	43 (24.6)
Papulosquamous disorders	31	Lichen planus	3 (9.7)
		Pityriasis rosea	1 (3.2)
		Pityriasis alba	18 (58.1)
		Plantar fissures	2 (6.5)
		Psoriasis	7 (22.6)
Pigmentary disorders	29	Idiopathic guttate hypomelanosis	4 (13.8)
		Melasma	4 (13.8)
		Postinflammatory pigmentation	5 (17.2)
		Steroid induced hypopigmentation	2 (7)
		Vitiligo	14 (48.3)
Unclassified	64	Acne vulgaris	12 (18.8)
		Alopecia areata	3 (4.7)
		Callosity	2 (3.1)
		Insect bite	2 (3.1)
		Keloid	2 (3.1)
		Milia	7 (10.9)
		Molluscum contagiosum	2 (3.1)
		Pellagrous dermatitis	2 (3.1)
		Seborrheic dermatitis	4 (6.3)
		Seborrheic kersatoses	5 (7.8)
		Xerosis	14 (21.9)
		Others*	9 (14.1)
Undiagnosed	79	Not significant dermatoses	35 (44.3)
		Photos not clear	44 (55.7)

*Others include acanthosis nigricans, aphthous ulcers, Discoid lupus erythematosus (DLE), intertrigo, purpura, skin tag, tattoo reaction, urticaria and lipoma

major conditions and constituted two-third of the skin diseases [Table 2].

About half the participants with confirmed skin disease (257 [49.4%]) had been suffering from the disease for more than 6 months. Most of them (402 [77.3%]) developed the condition gradually. Surprisingly, only 247 (47.5%) out of 520 participants suspected of skin disease have consulted medical professional for the condition. Recurrence (188 [76.1%]) and no improvement (34 [13.8%]) were major causes for the discontinuation of treatment.

Discussion

Although underestimated, the prevalence of skin diseases in the tribal area of Dahod, Gujarat was high. Infections and eczema constituted bulk of the skin diseases. The skin diseases were more prevalent in pediatric and older age groups and males. The treatment seeking and compliance to treatment was poor.

In Indian context, there were few attempts to determine pattern of skin diseases through hospital based studies.[1-5] There were also some attempts to determine prevalence of skin diseases in community settings through medical camps[6-8] but attempts to screen the entire community are rare.[9] This is probably first study to determine prevalence and pattern of skin diseases in the scheduled tribe community.

The prevalence of skin diseases in the general population in different geographic regions of India varies from 7.9% to 60%.[6-9] The staggering proportion of infections and eczema in the current study might indicate poor living conditions and hygiene in the tribal area of Gujarat. The poor health seeking behavior of the participants with confirmed skin diseases might be ascribable to poor health infrastructure as well as poor treatment outcome.

Primary care physicians (PCPs) serve as first contact for most patients seeking medical advice. Unfortunately, they lack knowledge in identifying skin diseases.[14,19,20] Further, the use of potent steroids and irrational use of corticosteroids is common even in tertiary care setting.[21,22] A recent study conducted near the study area also reported the lack of knowledge in identifying and management of skin diseases and highlighted the need of training PCPs.[23] Further research could be directed to explore diagnostic skills and management practices of skin diseases among PCPs in remote rural/tribal villages. Empowering PCPs in the identification and management of skin diseases is need of the hour.[14,20,23] A facility-based training module helped general practitioners improve diagnostic accuracy and referral pattern for common skin lesions.[24]

Tele-dermatology can bridge the gap to improve the identification and management of skin diseases in rural/tribal settings where consultant dermatologists are almost nonexistent. The current study demonstrated the usefulness of primitive teledermatology technique, namely "Store and Forward." However, there were some technological challenges faced during the study. Storage and proper transmission of photographs lacked in about 8% cases. Furthermore, image resolution was compromised due to transfer using WhatsApp.

Real-time interactive as well as hybrid techniques of teledermatology have been tested successfully in the past, but these techniques need sophisticated interface and connectivity.[15-17] Integrating dermatology departments of medical colleges with primary care centers might serve as the first feasible and sustainable step in addressing the issue.

Furthermore, advances in machine learning, neural networks and artificial intelligence can be leveraged for point-of-care clinical diagnosis of skin diseases. Initial research has already shown positive results about the accuracy of such applications in the diagnosis of some common skin diseases.[25]

Conclusion

Considering high prevalence of skin diseases in tribal villages of Dahod, Gujarat coupled with the inability of PCPs in the identification and management of skin diseases, new innovative avenues like teledermatology should be explored. Empowering PCPs along with advanced methods of teledermatology and artificial intelligence may be developed to attain accurate identification and evidence-based management of skin diseases in underprivileged communities.

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Conflicts of interest

There are no conflicts of interest.

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