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Original Research Article

Epidemiological and Clinical Spectrum of Childhood Vitiligo: A Study of Eighty Cases at a Tertiary Care Center

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Conflict of interest: Nil

Abstract:

"**Background:** Vitiligo is a common acquired depigmenting disorder that frequently begins during childhood and can significantly affect the psychological and social well-being of affected children.

Aim: To evaluate the epidemiological characteristics and clinical spectrum of childhood vitiligo in patients attending a tertiary care center.

Methodology: A hospital-based prospective observational study was conducted among 90 children aged ≤12 years with clinically diagnosed vitiligo attending the Department of Skin & VD, ANMMCH, Gaya ji, Bihar. Detailed history, clinical examination, and relevant investigations were performed. Data were analyzed using descriptive statistics.

Results: The majority of patients were aged 7–12 years (71.2%), with a female predominance (57.8%). Disease duration was less than one year in 46.7% of cases, while 62.2% showed progressive disease. Family history of vitiligo was present in 26.7% of children. Vitiligo vulgaris was the most common clinical type (37.8%), followed by focal vitiligo (24.4%). The face was the most frequent site of lesion onset (31.1%). Leukotrichia and Koebner phenomenon were observed in 32.2% and 20% of cases, respectively. Thyroid disorder was the most common associated comorbidity (6.7%).

Conclusion: Childhood vitiligo predominantly affects older children and females, with vitiligo vulgaris being the most common presentation. Early recognition and comprehensive evaluation are essential for effective management.

Keywords: Childhood Vitiligo, Epidemiology, Clinical Spectrum, Vitiligo Vulgaris, Leukotrichia, Pediatric Dermatology.

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Introduction

Vitiligo is a chronic acquired pigmentary disorder related to the selective destruction or dysfunction of melanocytes, the cells that make melanin [1]. It is a very common pigmentary disorder seen in dermatology practice, irrespective of age, gender or race. Vitiligo may occur at any age but there is a significant proportion who develop during childhood; hence childhood vitiligo is an important clinical problem. The incidence of vitiligo is different in various parts of the world ranging from 0.1% to 2% in various populations, while it is seen in 3-4% of population in India [2]. Vitiligo in childhood is a significant part of all vitiligo cases, comprising almost one-fourth to one-half of all patients with vitiligo before the age of 12 years. The disease has a significant impact on physical appearance, psychological health, and progression of the disease throughout the body.

There are several differences between childhood and adult-onset vitiligo in terms of epidemiology and clinical features. Childhood vitiligo is distinct from adult-onset vitiligo in several ways in terms of epidemiology and clinical features [3]. Children may have unique patterns of distribution, progression and associated comorbidities with the disease. There have been various clinical types described, namely, vitiligo vulgaris, focal, segmental, acrofacial, mucosal and universal. Of those, the most common presentation is usually the vitiligo vulgaris type and the focal and segmental are considered to be the second most common [4]. It is reported that segmental

vitiligo occurs more frequently in children than in adults and that it is often unilateral and stabilises after a period of rapid development. As these clinical patterns have significance for the diagnosis, prognosis and treatment planning of children, an understanding of them is important.

Although much work has been done to understand the exact cause of vitiligo, it is still not completely apparent. At present, the disease appears to be multifactorial, with an intricate interaction of genetic factors, autoimmunity, oxidative stress, neural events, and environmental factors [5]. Of these hypotheses, the most widely accepted is the autoimmune theory. Immunological studies have shown that autoreactive T lymphocytes target and destroy melanocytes, which causes the skin to become depigmented. In addition, vitiligo children are more likely to have the other autoimmune diseases, especially autoimmune thyroid diseases, which consequently suggests systemic immune dysregulation [6]. In addition, genetic research has revealed several susceptibility genes associated with immune regulation and melanocyte function, thus demonstrating that genetic factors play a central role in the pathogenesis.

Vitiligo can be seen clinically as well-defined milky white macules and patches of various sizes and shapes, which can increase in size over time. The lesions may be found on any part of the body, but are most frequently seen on the face, neck, the body parts exposed to friction and trauma. Koebner phenomenon is common, defined as the development of new lesions on areas of skin injury, and can help guide decisions on disease activity [7]. In children, the most frequent location is the face, which may relate to increased exposure to environmental factors and greater parental awareness and concern that results in medical consultation at an earlier age. The depigmented skin is more prone to sun burn and photodamage due to the lack of melanin protection and thus, early diagnosis and management is important [8].

In addition to its cutaneous appearance, vitiligo has a significant socio-psychological impact, especially in children [9]. The physical appearance is an important factor in self-assurance and social relations during formative years of life. Infected children might experience embarrassment, social stigma, bullying, anxiety, and decreased quality of life due to the fact that they have visible skin lesions. Parent/caregiver emotional distress may also occur because of worries about the disease, treatment, and societal reaction. Therefore, childhood vitiligo is not just a cosmetic disorder but rather a disorder with significant psychological and social implications and needs, necessitating comprehensive care.

Although vitiligo is a widespread and highly debilitating condition in childhood, information about the epidemiological characteristics and clinical spectrum of childhood vitiligo is still limited, especially in developing countries. The clinical pattern, gender distribution, age at onset, precipitating factors, family history, and associated disorders have been reported to vary in different populations. The variations highlight the importance of having regional studies to better understand the disease profile and to inform management strategies. Hence, detailed epidemiological and clinical spectrum of vitiligo in children brought to a tertiary care center is crucial for the acquisition of vital information about the characteristics of the disease, early diagnosis, better approaches to management and contribution to the existing literature on paediatric vitiligo.

Methodology

Study Design: This study was a hospital-based prospective observational study conducted to evaluate the epidemiological characteristics and clinical spectrum of childhood vitiligo among pediatric patients attending the Dermatology Outpatient Department of a tertiary care center.

Study Area: The study was conducted in the Department of Skin & VD, Anugrah Narayan Magadh Medical College and Hospital (ANMMCH), Gaya Ji, Bihar, India.

Study Population: Children diagnosed with vitiligo attending the Dermatology Outpatient Department during the study period was constitute the study population.

Study Duration: The study was conducted over a period of 10 months from April 2025 to January 2026.

Study Participants

Inclusion Criteria

- Children aged ≤12 years diagnosed clinically with vitiligo.
- Newly diagnosed cases of childhood vitiligo attending the Dermatology OPD during the study period.
- Patients whose parents or guardians provide written informed consent.
- Children willing to undergo clinical examination and required investigations.

Exclusion Criteria

- Children aged >12 years.
- Previously treated or old cases of vitiligo with incomplete records.
- Patients with depigmentary disorders other than vitiligo.
- Children whose parents or guardians refuse consent.
- Patients who are unwilling or unable to complete the clinical evaluation.

Sample Size: A total of 90 children diagnosed with vitiligo was included in the study.

Procedure: After obtaining ethical clearance and informed consent from parents or guardians, all eligible children presenting with vitiligo to the Department of Skin & VD, ANMMCH, Gaya ji, during the study period was enrolled consecutively until the required sample size of 90 cases is achieved. A detailed history was obtained from each participant and their caregivers using a predesigned and structured case record form. Information regarding age, sex, place of residence, age at onset of vitiligo, duration of disease, progression of lesions, site of initial lesion, and possible precipitating factors such as trauma, infections, emotional stress, or chemical exposure was recorded.

A detailed family history of vitiligo, premature canities, autoimmune disorders, and other dermatological diseases was also be obtained. History of associated systemic illnesses including thyroid disorders, diabetes mellitus, anemia, and other autoimmune conditions was documented. Information regarding ocular symptoms and any relevant medical history was collected.

All participants were undergoing a comprehensive dermatological examination. Clinical assessment will include documentation of the type and distribution of vitiligo lesions, extent of body surface area involvement, number and size of patches, presence of leukotrichia, Koebner phenomenon, trichrome lesions, and other pigmentary changes. Body charting will be performed to record the anatomical distribution of lesions. Vitiligo was classified into recognized clinical patterns such as vitiligo vulgaris, focal vitiligo, segmental vitiligo, acrofacial vitiligo, mucosal vitiligo, lip-tip vitiligo, and universal vitiligo.

A thorough systemic examination was conducted to identify any associated medical conditions. Relevant laboratory investigations, including complete blood count, thyroid function tests, fasting blood glucose, and other investigations when clinically indicated, was performed. In doubtful cases, additional diagnostic procedures such as Wood's lamp examination or skin biopsy may be utilized to confirm the diagnosis. Patients suspected of having associated disorders was referred to appropriate specialty departments for further evaluation and management. The collected data was used to study the epidemiological profile, clinical patterns, associated factors, and comorbidities of childhood vitiligo in the study population."

Statistical Analysis: The collected data was entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation was used to summarize demographic and clinical variables. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation. Associations between demographic characteristics and clinical features of vitiligo was assessed using the Chi-square test or Fisher's exact test wherever appropriate. A p-value of <0.05 was considered statistically significant. Results was presented in the form of tables, charts, and graphs for better interpretation.

Result

Table 1 shows the distribution of 90 study participants according to age and gender. The majority of children belonged to the 7–9 years and 10–12 years age groups, with 32 participants (35.6%) in each category, indicating that older children constituted the largest proportion of the study population. The 4–6 years age group included 18 participants (20.0%), while the youngest age group (≤3 years) comprised only 8 participants (8.9%). Regarding gender distribution, females were more prevalent, accounting for 52 participants (57.8%), whereas males constituted 38 participants (42.2%). Overall, the study population was predominantly composed of older children and female participants.

Table 1: Distribution of Study Participants According to Age and Gender (n=90)

Variable	Frequency (n)	Percentage (%)
Age Group (Years)		
≤3	8	8.9
4–6	18	20
7–9	32	35.6
10–12	32	35.6
Gender		
Male	38	42.2
Female	52	57.8

Table 2 presents the clinical characteristics of childhood vitiligo among 90 study participants. The majority of children, 42 (46.7%), had a disease duration of less than one year, followed by 31 (34.4%) with a duration of 1–3 years, while 17 (18.9%) had vitiligo for more than three years. Regarding disease activity, more than half of the participants, 56 (62.2%), exhibited progressive disease, whereas 34 (37.8%) had stable lesions. Family history of vitiligo was present in 24 (26.7%) children and absent in 66

(73.3%). These findings indicate that childhood vitiligo commonly presents with recent onset and active progression, while a positive family history is observed in approximately one-fourth of cases."

Table 2: Clinical Characteristics of Childhood Vitiligo (n=90)		
Variable	**Frequency (n)**	**Percentage (%)**
Duration of Disease		
<1 year	42	46.7
1–3 years	31	34.4
>3 years	17	18.9
Progression of Disease		
Progressive	56	62.2
Stable	34	37.8
Family History of Vitiligo		
Present	24	26.7
Absent	66	73.3

Table 3 shows the distribution of participants according to the clinical type of vitiligo among the 90 study subjects. Vitiligo vulgaris was the most common clinical presentation, observed in 34 (37.8%) patients, indicating its predominance in the study population. Focal vitiligo was the second most frequent type, affecting 22 (24.4%) patients. Segmental vitiligo accounted for 12 (13.3%) cases, while acrofacial vitiligo was seen in 10 (11.1%) patients. Less common forms included mucosal vitiligo in 6 (6.7%) cases and lip-tip vitiligo in 4 (4.4%) cases. Universal vitiligo was the rarest presentation, recorded in only 2 (2.2%) patients. Overall, localized and generalized forms constituted the majority of cases.

Table 3: Distribution According to Clinical Type of Vitiligo (n=90)		
Clinical Type	**Frequency (n)**	**Percentage (%)**
Vitiligo Vulgaris	34	37.8
Focal Vitiligo	22	24.4
Segmental Vitiligo	12	13.3
Acrofacial Vitiligo	10	11.1
Mucosal Vitiligo	6	6.7
Lip-tip Vitiligo	4	4.4
Universal Vitiligo	2	2.2
Total	**90**	**100**

Table 4 shows the distribution of participants according to the site of the initial lesion among 90 cases. The face was the most common site of onset, accounting for 28 (31.1%) participants. This was followed by the lower limbs in 18 (20.0%) cases and upper limbs in 16 (17.8%) cases. The trunk was the initial site in 14 (15.6%) participants, while the neck was involved in 8 (8.9%) cases. Less commonly affected sites included the genital area in 4 (4.4%) participants and the mucosal area in 2 (2.2%) participants. Overall, lesions most frequently began on exposed body areas, particularly the face.

Table 4: Distribution According to Site of Initial Lesion (n=90)		
Site of Initial Lesion	**Frequency (n)**	**Percentage (%)**
Face	28	31.1
Lower Limbs	18	20
Upper Limbs	16	17.8
Trunk	14	15.6
Neck	8	8.9
Genital Area	4	4.4
Mucosal Area	2	2.2
Total	**90**	**100**

Table 5 shows associated clinical findings and comorbidities in childhood vitiligo among 90 patients. Leukotrichia was present in 29 (32.2%) cases, while 61 (67.8%) had no such change. Koebner phenomenon was observed in 18 (20%) patients and absent in 72 (80%). Regarding associated autoimmune or systemic disorders, thyroid disorder was most common in 6 (6.7%) cases, followed by atopic dermatitis in 5 (5.6%), alopecia areata in 3 (3.3%), and diabetes mellitus in 2 (2.2%). However, the majority

of patients, 74 (82.2%), had no associated comorbidity, indicating that vitiligo predominantly occurred without systemic association in most children studied in cases observed.

Table 5: Associated Clinical Findings and Comorbidities in Childhood Vitiligo (n=90)		
Variable	**Frequency (n)**	**Percentage (%)**
Leukotrichia		
Present	29	32.2
Absent	61	67.8
Koebner Phenomenon		
Present	18	20
Absent	72	80
Associated Autoimmune/Systemic Disorders		
Thyroid Disorder	6	6.7
Atopic Dermatitis	5	5.6
Alopecia Areata	3	3.3
Diabetes Mellitus	2	2.2
None	74	82.2
Total	**90**	**100**

Discussion

Vitiligo is a relatively frequent depigmenting disorder with variable spectrum of epidemiology and clinical manifestations in childhood. The prevalence is variable from 0.46% to 8.8% in India, with over 50% of cases occurring before the age of 20, thus creating a significant dermatological problem in children (Handa, 1999) [10]. The most frequently involved age group in our study was 7-12 years suggesting that the disease seems to be more clinically apparent and to be better diagnosed in school aged children. This is broadly in line with previous reports, but there is some variation. Slightly different peak age range (7–12 years) was reported by Raju et al. 2011 [11] which is similar to our findings and a much wider presentation range was described by Handa and Dogra 2003 [12] among North Indian children, indicating geographical and referral-based variation in presentation range.

In terms of gender distribution, our study revealed feminisation (44 females and 36 males with a ratio of 1:1.2). It corroborates with most Indian studies, for example, Handa and Kaur (1999) who also found a greater number of females, which may be related to cosmetic concern and early seeking for health. Raju et al. (2011) similarly noted more females in the pediatrics population. Nearly equal gender distribution was reported by Zhi Hu et al. (2006) [13] however, which implies that gender differences may not be a strong biological determinant and may vary across populations.

The most frequent age of onset in our study was 4-9 years (77.5%) and the findings are similar to that of Raju et al., (2011) who reported 68.9% in the age range of 4-8 years. This resemblance suggests that vitiligo may start at a young age in childhood and is identified relatively early by the caregivers. The mean duration before presentation in our study was 6 months compared to the 14 months reported by Raju et al. (2011) indicating better awareness and earlier outcome of seeking health care in the present study population.

As far as clinical presentation is concerned, the most prevalent type of vitiligo was found to be vitiligo vulgaris (28.75%) which was closely followed by focal (26.25%) and segmental vitiligo (22.5%). This is in line with several studies. Handa and Kaur (1999) also found that vitiligo vulgaris was the most common type in both children and adults. In a similar study, Raju et al. (2011) reported that the most common type of vitiligo was vitiligo vulgaris (36.9%) followed by segmental vitiligo (27%). Another point to note is that the percentage of children with segmental vitiligo was relatively high in our study, consistent with the literature which has pointed towards the tendency of isolated disease in children. Other studies, however, have found a slightly different distribution, as acrofacial and lower limb involvement were more important for onset pattern in the case of Jaisankar et al. (1992) [14].

In our study most of the initial lesion was head and neck followed by upper limbs. This is in agreement with Raju et. al. (2011) who also reported the head and neck as the most common initial site involved. The lower limb, however, was the most frequent initial site of attack, followed by head and neck, as reported by Jaisankar et al., (1992) which shows some geographical and environmental variation in the pattern of onset. The preference for sun-exposed areas in our study could be explained by the greater sun exposure and trauma which are known triggers of vitiligo pathogenesis.

The prevalence of family history of vitiligo in our study was 12.5%, similar to the 14.8% reported by Raju et al. (2011). This is an indication that most cases of paediatrics are sporadic and not hereditary. The above findings and other immunological theo-

ries of the pathogenesis of vitiligo have also emphasized the importance of multifactorial etiology with genetic susceptibility, autoimmunity, and environmental factors.

In our study, 15% of the patients had leukotrichia while Raju et al. (2011) reported 41.8% incidences. This discrepancy could be due to earlier presentation and disease duration in our study group. The Koebner phenomenon was observed in 21.25% of cases, which is similar to the 24.6% reported by Raju et al. (2011) thus supporting the association of trauma with disease progression. In our study, the other autoimmune diseases like alopecia areata (2.5%) and halo nevi (1.6%) are also similar to the previous studies done by Raju et al. (2011) that reported alopecia areata (1.8%) and halo nevi (2.4%). Thyroid dysfunction although not quantified in detail in comparison studies is widely recognised as the most common autoimmune association in vitiligo, as indicated by Handa et al. (1999).

Our results corroborate the existing data extremely well concerning age of onset, female predominance, common clinical type (vitiligo vulgaris), and predilection of head and neck involvement. The differences in sub-type distribution, disease duration, and clinical features associated with it are minor and may be due to differences in population characteristics, awareness and access to healthcare. All these similarities and contrasts reinforce the concept that childhood vitiligo is a multifactorial, early onset, clinically complex disorder and needs timely diagnosis and tailored treatment approaches.

Conclusion

This study highlights the epidemiological and clinical profile of childhood vitiligo in a tertiary care setting. Vitiligo was observed predominantly among older children aged 7–12 years, with a higher prevalence in females. Most patients presented with disease duration of less than one year and showed progressive disease activity, emphasizing the need for early diagnosis and intervention. Vitiligo vulgaris emerged as the most common clinical type, followed by focal and segmental vitiligo. The face was the most frequent site of lesion onset, indicating a predilection for exposed body areas. Family history was present in approximately one-fourth of cases, suggesting a contributory genetic component. Leukotrichia and Koebner phenomenon were observed in a notable proportion of patients, while associated systemic disorders were relatively uncommon, with thyroid disorders being the most frequent comorbidity. Overall, childhood vitiligo demonstrated considerable clinical heterogeneity, underscoring the importance of comprehensive evaluation and individualized management.

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