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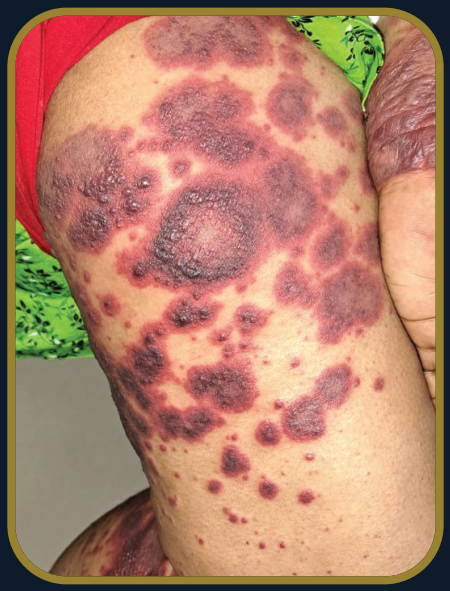

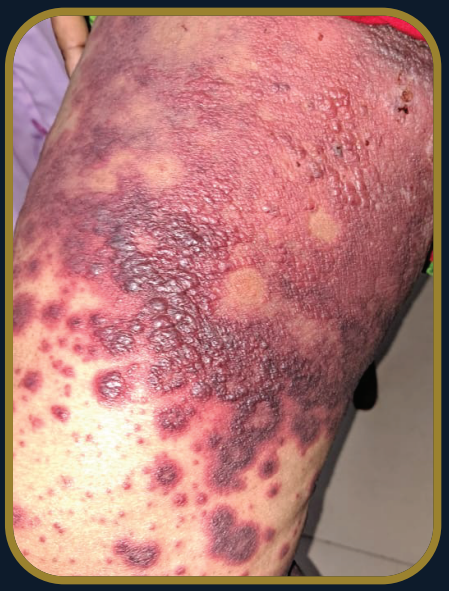

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Original Article:

Study of common allergens for United Airway Disease by skin prick test: A single center study

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Abstract

Background: United Airway Disease (UAD) encompasses allergic rhinitis and bronchial asthma, sharing common immunopathological mechanisms and environmental triggers. Identifying region-specific aeroallergens is essential for effective diagnosis and management. This study aimed to identify the most prevalent inhalant allergens in UAD patients using skin prick testing at a tertiary care center in Dhaka, Bangladesh. **Methods:** A cross-sectional observational study was conducted at the Department of Respiratory Medicine, Medicine, Dermatology and Venereology, Bangabandhu Sheikh Mujib Medical University (BSMMU) from March 2017 to February 2018. A total of 100 patients diagnosed with allergic rhinitis and/or bronchial asthma underwent skin prick testing with 62 allergen extracts, including pollens, fungi, insects, dust, animal dander, fabric, and miscellaneous allergens. Positive reactions were assessed 15 minutes post-application, with a wheal size of +2 or greater considered significant. **Results:** Among 100 participants, 43% had allergic rhinitis, 22% had bronchial asthma, and 35% had both conditions. The majority of patients were aged 21-30 years (44%) and were predominantly male (58%). Pollens were the dominant allergens occurring in over one third of patients (32%). This was followed by dust mites (Dermatophagoides farina) showing a 23% positivity rate. Insect allergens, particularly female cockroach (16%) and male cockroach (12%), also showed high reactivity. House dust (19%) and paper dust (19%) were prevalent dust allergens. Fungal allergens like Aspergillus fumigatus (10%) and textile allergens such as Kapok cotton (10%) were also notable. These findings reveal a significant overlap between allergic rhinitis and bronchial asthma, with varied sensitivities to different allergens. **Conclusion:** The findings demonstrate a significant overlap in allergen sensitivity between the upper and lower airways, supporting the UAD concept. Early identification of common allergens through skin prick testing can guide targeted interventions and personalized immunotherapy, improving outcomes for patients with allergic airway diseases in Bangladesh.

Keywords: Asthma, United Airway Disease, Skin Prick Test, Aeroallergens, Bangladesh

Introduction

Allergic diseases, including allergic rhinitis and asthma, have become a significant public health concern worldwide, with an increasing prevalence in both developed and developing countries. Allergic rhinitis affects between 10% and 30% of the population globally, and sensitization to environmental allergens, particularly foreign proteins, is present in up to 40% of individuals [1]. The rise in allergic diseases has been particularly notable in industrialized countries over the past 50 years, with studies indicating that the prevalence of asthma in children has grown substantially [2]. This rise has led to a stronger understanding of the relationship between allergic rhinitis and bronchial asthma, with up to 80% of asthmatic patients also suffering from allergic rhinitis and about 40% of individuals with allergic rhinitis developing bronchial asthma. This overlapping of diseases has led to

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the concept of United Airway Disease (UAD), where both the upper and lower airways are affected by similar allergic processes [3-5].

Aeroallergens, which include pollen, fungal spores, dust mites, animal dander, and other bioparticulates, are known to play a critical role in the pathogenesis of allergic rhinitis and asthma. These allergens trigger IgE-mediated immune responses in susceptible individuals, leading to symptoms such as nasal congestion, sneezing, and asthma-related symptoms like wheezing and coughing. The role of airborne bioparticles in causing allergic reactions has long been studied within the field of aerobiology, which focuses on the study of pollen, spores, and other airborne microorganisms as agents of infection or allergy [6]. Bioparticulates, particularly pollen and fungal spores, are significant contributors to allergic diseases, and their presence varies across different environmental regions. Understanding the specific aeroallergens responsible for these conditions is crucial for effective diagnosis and treatment [7,8].

In Bangladesh, allergic rhinitis and asthma are increasingly prevalent, with environmental and genetic factors contributing to the growing number of cases. Local studies have identified a range of airborne allergens, including pollen, fungi, dust mites, and animal dander, that are responsible for allergic reactions in the population. Exposure to these allergens has been linked to an increased incidence of allergic rhinitis and asthma, especially in urban settings where environmental factors such as pollution exacerbate the condition [9]. This growing burden of allergic diseases, particularly in individuals diagnosed with United Airway Disease, underscores the need for further research into the specific allergens contributing to these conditions.

In line with these findings, studies on the quality of life of patients with allergic rhinitis have highlighted the impact of these conditions on daily activities and overall well-being, further emphasizing the importance of accurate diagnosis and targeted treatment [10]. Understanding the local prevalence of allergens responsible for allergic diseases is crucial for developing effective diagnostic and therapeutic strategies. Furthermore, aeroallergens exhibit variability across regions, and their identification is essential for improving immunotherapy outcomes for allergic patients [11] The skin prick test remains one of the most effective diagnostic tools for identifying specific allergens responsible for allergic reactions. This study aims to evaluate and identify the common allergens responsible for allergic rhinitis and asthma in patients diagnosed with United Airway Disease at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. The findings of this study wil valuable data on the prevalence of allergens such as pollen, fungi, dust, and animal dander in this population, which is essential for developing targeted prevention and treatment strategies.

Methodology

This cross-sectional observational study aimed to assess the prevalence of positive reactions to various allergen extracts in patients with respiratory complaints was conducted over one year, from 01 March 2017 to 28 February 2018 at the Department of Respiratory Medicine, Medicine, Dermatology and Venereology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh.

A total of 100 patients with allergic rhinitis and/or bronchial asthma aged between 18 and 60 years were included in the study.Patients with other respiratory illnesses, uncontrolled asthma or taking any anti-allergic medications or systemic corticosteroids were excluded from the study. Pregnant or breastfeeding women were not included.

Skin prick testing was conducted to assess allergic sensitivity to various allergens. A total of 62 allergen extracts were used, which included:

- Pollen allergens: 36 types
- Fungi allergens: 5 types
- Insect allergens: 4 types
- Dust allergens: 8 types
- Animal dander: 4 types
- Fabric allergens: 3 types
- Miscellaneous allergens: 2 types

In addition, positive control (glycerol: histamine acid phosphate [1:100]) and negative control (glycerol buffer) were included to validate the results.

For each patient, a drop of allergen extract (concentration 1:10) was placed on the ventral aspect of the forearm. A 26-gauge hypodermic needle was used to introduce the allergen 0.5 mm beneath the skin. This procedure was done with 64 pricks, including the 62 allergens, positive, and negative controls. A 2 cm distance was maintained between each allergen to prevent cross-contamination.

Skin reactions were observed 15 minutes after the application of allergens. The wheal size was measured, and reactions were classified as follows:

- 2+ and above: Strongly positive reactions
- 1+: Mildly positive reactions
- Negative: No visible reaction

Data Analysis

Data were analyzed using descriptive statistics. Frequencies and percentages were calculated to summarize the prevalence of positive reactions (+2 to +4) for each allergen extract. Results were presented in tables to provide a clear overview of the allergic response to the various allergen extracts. All statistical analyses were conducted using SPSS version 23, and the results were expressed as percentages.

Result

Table 1 illustrates the distribution of 100 patients based on their diagnoses of allergic rhinitis, bronchial asthma, or a combination of both. Of the total participants, 43% (43 patients) were diagnosed with allergic rhinitis, making it the most common condition in the study. A smaller group, 22% (22 patients), were diagnosed with bronchial asthma exclusively. Interestingly, 35% (35 patients) of the participants had both allergic rhinitis and bronchial asthma, indicating a significant overlap between the two conditions. (Table 1)

Table 1: Distribution of Study Participants Based on Diagnosis of Allergic Rhinitis and Bronchial Asthma (n=100)

Indices	Number of patients (n=100)	Percentage
Allergic rhinitis	43	43%
Bronchial asthma	22	22%
Allergic rhinitis & Bronchial asthma	35	35%

Table 2 shows the demographic distribution of the study participants (n=100). Most patients were in the 21-30 years age group (44%), followed by those ≤ 20 years (32%). Fewer participants were in the older age groups, with 31-40 years (14%), 41-50 years (6%), and 51-60 years (4%). In terms of gender, 58% of participants were male, while 42% were female. (Table 2)

Table 2: Demographic Distribution of Patients Based on Age and Gender

Variables	Number of patients (n=100)	Percentage
Age (years)		
≤20	32	32%
21-30	44	44%
31-40	14	14%
41-50	6	6%
51-60	4	4%
Gender		
Male	42	42%
Female	58	58%

Table 3 presents the prevalence of positive reactions to various pollen allergen extracts in skin prick testing, with the results showing the percentage of patients who exhibited marked positive reactions (+2 to +4). The most common allergens were Cynodondactylon and Ricinuscommunis, with 26% and 29% of patients showing positive reactions, respectively. Other significant allergens included Amaranthusspinosus and Partheniumhysterophorus, both of which had positive reactions in 29% and 27% of patients, respectively. Allergens such as Sorghum vulgare (16%), Brassica campestris (21%), and Argemonemexicana (24%) also showed notable prevalence rates. In contrast, some allergens like Ipomoea fistulosa, Kocosnucifera, and Kigeliapinnata exhibited very low positive reaction rates, at only 4%. (Table 3)

Table 3: Prevalence of Positive Reactions to Pollen Allergen Extracts in Skin Prick Testing

Allergen extract	Total number of patients receive allergen	Marked positive reaction +2+4	Percentage
Cynodondactylon	100	26	26%
Sorghum vulgare	100	16	16%
Pennisetum, typhoides	100	12	12%
Zea Mays	100	7	7%
Gynandropsisgynandra	100	11	11%
Brassica campestris	100	21	21%
Ranunculus sceleratus	100	16	16%
RumexDenatus	100	9	9%
Ricinuscommunis	100	29	29%
Artemisiascoparia	100	16	16%
Argemonemexicana	100	24	24%
Cannabis sativa	100	9	9%
Chenodopodium album	100	14	14%
Lawsoniainermis	100	7	7%
CyperusRotundus	100	16	16%
Adhatodavasica	100	21	21%
Ageratum Conyzoides	100	14	14%
Xanthium Strumarium	100	16	16%
DododnaeaViscosa	100	7	7%
Amaranthusspinosus	100	29	29%
Partheniumhysterophorus	100	27	27%
Ipomoea fistulosa	100	4	4%
Maeruaarenaria	100	16	16%
Suaedafruticos	100	14	14%
Chenopoiummurale	100	14	14%
Putranjivaroxburghii	100	21	21%
Albizialebbeck	100	19	19%
Ailanthusexcelsa	100	22	22%
Eucalyptus tereticornis	100	27	27%
Broussentiapapyrifera	100	6	6%
Holopteleaintegriforia	100	19	19%
Morus alba	100	7	7%
Prospisjulifloria	100	14	14%
Azadirchtaindica	100	9	9%
Kocosnucifera	100	4	4%
Kigeliapinnata	100	4	4%

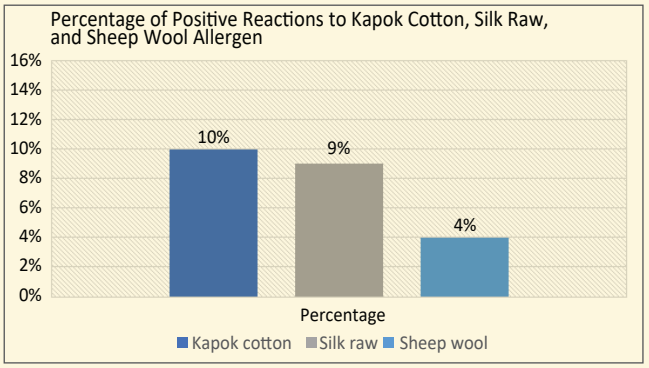

Fig 1. Percentage of Positive Reactions (+2 to +4) to Kapok Cotton, Silk Raw, and Sheep Wool Allergen

Figure 1 displays the percentage of positive reactions (+2 to +4) to three allergen extracts: Kapok cotton, Silk raw, and Sheep wool. The highest percentage of positive reactions was observed with Kapok cotton, showing 10% of patients with a positive response. Silk raw had a slightly lower rate, with 9% of patients testing positive, while Sheep wool exhibited the lowest percentage, with only 4% of patients showing positive reactions. These findings suggest a higher prevalence of allergic reactions to Kapok cotton compared to Silk raw and Sheep wool allergens. (Figure 1)

Table 4 shows the prevalence of positive reactions (+2 to +4) in skin prick tests with fungi and insect allergen extracts in patients with United Airway Disease. Aspergillus fumigatus had the highest positive reaction rate among fungi, at 10%, while other fungi like Aspergillus niger, Aspergillus versicolor, and Candida albicans showed lower rates (4-7%). Insect allergens exhibited higher reaction rates, with female cockroach leading at 16%, followed by male cockroach at 12%, and moth at 11%. Rice weevil showed the lowest insect allergen reaction at 7%. (Table 4)

Table 4: Prevalence of Positive Reactions (+2 to +4) in Skin Prick Tests with Fungi and Insect Allergen Extracts in Patients with United Airway Disease

Allergen extract	Total number of patients receive allergen	Marked positive reaction +2+4	Percentage
Skin prick test with fungi extract			
Aspergillus fumigatus	100	10	10%
Aspergillus nigus	100	7	7%
Aspergillus Versicolor	100	4	4%
Aspergillus flavus	100	4	4%
Candida albicans	100	6	6%
Skin prick test with insect allergens extract			
Cockroach (female)	100	16	16%
Cockroach (male)	100	12	12%
Moth	100	11	11%
Rice wevil	100	7	7%

Table 5 presents the prevalence of positive reactions (+2 to +4) in skin prick tests with dust and animal dander allergen extracts in patients with United Airway Disease. Among the dust allergens, house dust and paper dust had the highest positive reaction rate at 19%, other dust allergens, such as cotton mill dust (10%), grain dust wheat (9%), and hay dust (9%). Grain dust bajra and grain dust rice had the lowest rates of 2% and 4%, respectively. In terms of animal dander, cat dander was the most reactive allergen, with 9% of patients showing positive reactions, followed by dog dander at 7%. Cow dander and human dander exhibited lower reaction rates of 4% and 2%, respectively. (Table 5)

Table 5: Prevalence of Positive Reactions (+2 to +4) in Skin Prick Tests with Dust and Animal Dander Allergen Extracts in Patients with United Airway Disease

Allergen extract	Total number of patients receive allergen	Marked positive reaction +2+4	Percentage
Skin prick test with dust allergens extract			
House dust	100	19	19%
Paper dust	100	19	19%
Cotton mill dust	100	10	10%
Grain dust wheat	100	9	9%
Grain dust bajra	100	2	2%
Grain dust rice	100	4	4%
Hay dust	100	9	9%
Straw dust	100	4	4%
Skin prick test with animal dander extract			
Cat dander	100	9	9%
Dog dander	100	7	7%
Cow dander	100	4	4%
Human dander	100	2	2%

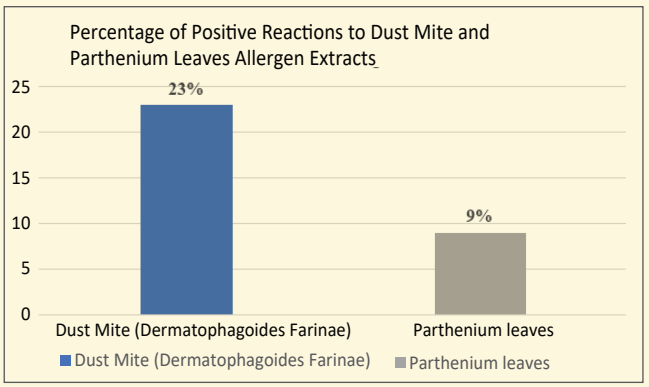

Fig 2. Percentage of Positive Reactions to Dust Mite and Parthenium Leaves Allergen Extracts

Figure 2 illustrates the percentage of positive reactions (+2 to +4) to Dust Mite (Dermatophagoidesfarinae) and Parthenium leaves allergen extracts. Dust mite sensitivity was observed in 23% while parthenium leaf sensitivity was seen in 9%

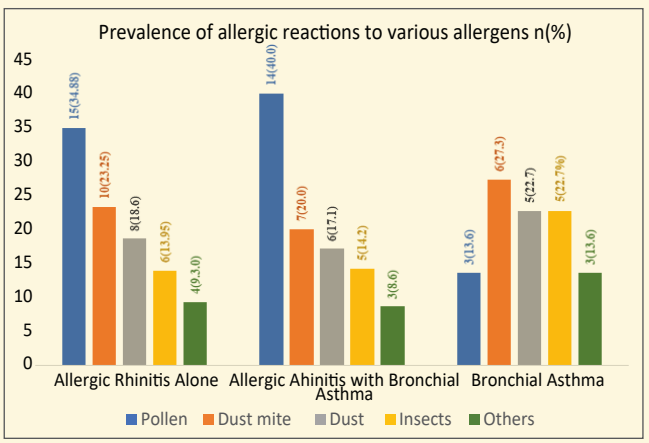

Fig 3. Prevalence of allergic reactions to various allergens in patients with allergic rhinitis (AR), bronchial asthma (BA), and both conditions (BA + AR).

Figure 3 shows the prevalence of allergic reactions to various allergens in patients with allergic rhinitis (AR), bronchial asthma (BA), and both (BA + AR). Pollen is the most common allergen overall particularly in patients with AR alone (34.9%) and in those with AR and BA (40%), followed by dust mites and dust.Sensitivity to insects and other allergens is also notable.

Discussion

This study identifies the prevalence of common inhalant allergens among patients with United Airway Disease (UAD) and highlights the overlapping sensitization patterns that affect both the upper and lower airways. The findings underscore the principle of UAD, which conceptualizes allergic rhinitis and asthma as manifestations of a single chronic inflammatory airway condition [5,12].

The highest prevalence of sensitization was seen in young adults aged 21–30 years, consistent with earlier findings that allergic diseases often manifest during adolescence and early adulthood [13]. Male predominance in our cohort is also supported by regional epidemiological data, suggesting a gender predisposition in allergic diseases due to hormonal, genetic, or environmental factors [4,11].

Among pollen allergens, Amaranthusspinosus, Ricinuscommunis, Partheniumhysterophorus, and Cynodondactylon were identified as the most common sensitizers. These allergens have also been found to be major contributors to allergic rhinitis and seasonal asthma in other parts of India [7,14]. Specifically, Parthenium is known for its aggressive growth and extensive pollination, which exacerbates respiratory allergic diseases [8].

Dust mite (Dermatophagoidesfarinae) was an important allergen in all three groups, with a 23% positivity rate, reflecting similar results seen in both allergic rhinitis and bronchial asthma patients in previous Indian and international studies [12,9]. The significance of dust mite sensitization in asthma has been particularly emphasized in urban settings, where indoor environmental pollution plays a substantial role.

Sensitization to insect allergens, particularly cockroaches (female) at 16% and cockroaches (male) at 12%, is consistent with previous findings in nasobronchial allergy patients [15,16]. Cockroach allergens have been strongly linked not only to allergic rhinitis but also to bronchial hyperresponsiveness and chronic asthma, especially in overcrowded and poorly ventilated-urban dwellings. Their proteolytic enzymes act as potent airway sensitizers and are considered significant triggers for persistent asthma.

Similarly, moderate reactivity to fungal allergens such as Aspergillus fumigatus (10%) supports earlier evidence that fungal spores are common in both allergic rhinitis and lower airway diseases like allergic bronchopulmonary aspergillosis [6]. The role of Aspergillus species has also been linked to increased asthma severity in sensitized individuals [17].

A noteworthy finding in our study is the sensitization to textile allergens like Kapok cotton (10%) and Silk raw (9%), which, although less frequently studied, have been implicated in occupational asthma and rhinitis among textile workers [7]. This suggests the importance of evaluating occupational exposure history during clinical assessments.

The overlap of allergens in patients with both upper and lower airway symptoms support the theory of a shared immunopathogenesis in allergic rhinitis and asthma. Both conditions involve Th2-type immune responses, elevated IgE levels, eosinophilic inflammation, and similar inflammatory mediators. These shared pathways explain the frequent co-occurrence of allergic rhinitis in up to 80% of asthma patients and vice versa [5,12].

Comparative analysis with diseases such as atopic dermatitis and conjunctivitis further extends the atopic spectrum. For instance, allergens like dust mite and cockroach are commonly associated with flare-ups in atopic dermatitis, suggesting systemic sensitization in predisposed individuals [10]. Likewise, ocular allergies often coexist with seasonal rhinitis and are triggered by the same pollen or fungal allergens [14,18].

Conclusion

This study highlights the most prevalent allergens responsible for sensitization in patients with United Airway Disease (UAD). The significant overlap of allergen sensitivity affecting both the nasal and bronchial airways supports the unified concept of UAD, wherein allergic rhinitis and asthma are part of a continuous inflammatory process rather than isolated conditions. Recognizing these shared allergenic triggers is essential for comprehensive disease management. Our study shows that overall, the most common allergen is pollen, followed by dust mites, particularly in those with allergic rhinitis with or without bronchial asthma. For those with bronchial asthma alone, dust mites are the most common. Early detection through skin prick testing, combined with targeted allergen avoidance strategies and potential immunotherapy, can play a vital role in reducing symptom burden, preventing disease progression, and enhancing overall patient quality of life.

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Informed Consent Statement

All patients provided written informed consent.

Ethical Considerations

Ethical approval was obtained from the BSMMU IRB. Participants were provided with clear explanations of the study, and written informed consent was obtained. Their confidentiality was maintained, and the risks and benefits were clearly outlined.

Conflict of interest

There are no conflicts of interest among authors.

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Bangabandhu Sheikh Mujib Medical University (BSMMU)

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Brief Report:

Patterns of Vasculitis in Dermatological Practice

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Abstract

Background: Vasculitis is a rare disorder with a wide range of systemic and cutaneous manifestations. This study was aimed to identify the clinico-demographic characteristics of different patterns of vasculitis and determine their frequency in dermatological practice. **Methods:** This descriptive cross-sectional study was conducted on 48 cases of vasculitis diagnosed on the basis of clinical, histological, and laboratory parameters from January 2017 to December 2022 in the Department of Dermatology, BSMMU. Specific causes, types, and patterns of systemic and cutaneous manifestations were recorded and analyzed. **Results:** The seven diagnoses of vasculitis were cutaneous small vessel vasculitis (CSVV) (41.7%), polyarteritis nodosa (PAN) (14.6%), IgA vasculitis (IgAV) (12.5%), granulomatosis with polyangiitis (GPA) (12.5%), livedoid vasculopathy (8.3%), eosinophilic granulomatosis with polyangiitis (EGPA) (6.3%), and urticarial vasculitis (4.2%). Cutaneous findings included palpable purpura, urticaria subcutaneous nodule, livedo reticularis, erythematous plaque, hemorrhagic vesicle, and ulcer. Extracutaneous findings included fever, fatigue, weight loss, arthralgia, myalgia, abdominal pain, bloody stool, shortness of breath, wheezing, cough, chest pain, hemoptysis, sinusitis, nasal discharge, and hearing loss. **Conclusion:** The current study would be very helpful in the diagnosis and monitoring of patients with vasculitis having various cutaneous presentations, considering the future possibilities of other systemic involvement.

Keywords: Cutaneous small vessel vasculitis, Polyarteritis nodosa, IgA vasculitis, Granulomatosis with polyangiitis.

Introduction

Vasculitis is a relatively uncommon disorder, with a reported annual incidence of 40–54 cases per million people [1]. It is defined as the inflammation of blood vessels that can affect any part of the body. When vasculitis affects capillaries, post-capillary venules, and muscular arterioles in the superficial and mid dermis (<50 µm in diameter) [2], it is known as primary cuteneous vasculitis. Although approximately half of all cases of cutaneous vasculitis are skin-confined and self-limited, they can also appear as initial manifestations of systemic vasculitis or later progress to systemic vasculitis [3].

Preliminary skin presentation of vasculitis includes variable and active types of discoloration, swelling, bleeding, and necrosis. Physical signs of vasculitis include urticaria, purpura, purpuric papules, infiltrated erythema, ulcer, infarct, livedo reticularis, and nodules that affect the skin with varying intensities, depths, and distributions[4]. The classification of vasculitides has been a confusing and debate-provoking topic over the last half-century.[5] The 2012 Revised International Chapel Hill Consensus Conference Nomenclature of Vasculitides also has limitations [6]. Marzano et al. adopted a recently proposed working classification that focused on cutaneous small vessel vasculitis (CSVV), IgA vasculitis, urticarial vasculitis, and a variety of cutaneous manifestations that may be observed in the course of the main systemic vasculitides, such as polyarteritis nodosa (PAN), granulomatosis with polyangiitis (GPA), and eosinophilic granulomatosis with polyangiitis (EGPA). Livedoid vasculopathy, a cutaneous entity of non-frankly vasculitic origin, was also included in this classification [5].

CSVV is the most common form of vasculitis in dermatology that affects post-capillary venules, also known by the histologic term leukocytoclastic vasculitis

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(LCV) [6]. Palpable purpura is a hallmark of this disease [7]. Urticarial vasculitis presents histologically as fixed urticarial lesions with vasculitis [5]. IgA vasculitis is characterized by purpura, arthralgia, and abdominal and renal disease. IgA, C3, and fibrin deposition have been demonstrated in biopsies of both involved and uninvolved skin using immunofluorescence techniques [8]. Livedoid vasculopathy is a chronic, recurrent, painful disorder characterized by purpuric macules, papules, hemorrhagic crust, and irregular superficial ulcers around the ankle that heal with an atrophic scar [9].

Polyarteritis nodosa is a systemic necrotizing vasculitis that predominantly affects medium-sized muscular arteries, with an annual incidence rate of 0.9–8.0 per million and a prevalence of 31 per million [10]. The skin is involved in 50% of patients with systemic PAN [11]. ANCA-associated vasculitis (AAV) is a group of vasculitis predominantly affecting small vessels [12]. Cutaneous findings occur in 45% of patients with GPA and two-thirds of patients with EGPA [13,14].

From the perspective of dermatologists, it is always a major concern whether vasculitis is exclusively confined to the skin or a manifestation of more widespread systemic involvement. Identifying the pathognomonic cutaneous features of a certain type of vasculitis and further confirmation by histopathology, imaging, and relevant laboratory tests are crucial for proper diagnosis and management. The current study aimed to identify the variable clinical characteristics of different types of vasculitis and determine their frequency. This study was an approach used by dermatologists to work on both the cutaneous and systemic profiles of vasculitis. It may guide future dermatologists in the diagnosis, treatment, and proper referral of patients with vasculitis.

Methods

This descriptive cross-sectional study was conducted from January 2017 to December 2021 on 48 patients at the Department of Dermatology and Venereology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. Patients were conveniently selected from the Department of Dermatology and Rheumatology (who were referred for cutaneous evaluation and skin biopsy). All patients underwent lesional skin biopsy and histopathology reports with a direct immunofluorescence test (DIF) were provided by the Pathology Department. The diagnosis of vasculitis was ascertained by dermatologists based on history, clinical examinations, histopathology with direct immunofluorescence test (DIF), urinalysis, ANCA, routine laboratory parameters, and radiological findings [6].

Age, sex, disease duration, cutaneous and systemic features, and laboratory investigations were recorded by using a standard and pretested semi-structured questionnaire. The patients were plotted into seven patterns of vasculitis (CSVV, PAN, IgA vasculitis, GPA, Livedoid vasculopathy, EGPA and Urticarial vasculitis) according to the proposed working classification.5All of which were described based on age, sex, disease duration, and cutaneous and systemic presentation. Statistical analysis was performed using the Statistical Package for the Social Science (SPSS) software version 26.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Quantitative variables (frequency of vasculitis, age, and duration) were expressed as mean ± SD. Qualitative data (sex, cutaneous, and extracutaneous presentation) were expressed as frequencies and percentages. Informed written consent to participate in the study has been obtained from all adult participants and all underaged participants' parent/legal guardian/next of kin. Patient privacy, safety, and proper treatment were ensured. Prior approval was obtained from the Institutional Review Board (IRB) (IRB-number-BSMMU/2016/10817) of BSMMU.

Result

The mean age of all study participants was 29.0±12.2 years and the median age was 30 years. The majority (41.7%) were diagnosed with CSVV, followed by PAN, IgA vasculitis, EGPA, Livedoid vasculopathy, and Urticarial Vasculitis (Fig. 1). The mean ages in years were 24±9.8 (CSVV), 26±9.8 (PAN), 21±10.1 (IgA vasculitis), 46±7.1 (GPA), 32±6.5 (Livedoid vasculopathy), 42±17.6 (EGPA) and 27±3.5 years (urticarial vasculitis) respectively.CSVV, EGPA, Livedoid vasculopathy, and urticarial vasculitis were more prevalent in females whereas PAN and GPA were common in males. The average disease duration was higher (64±54.1 years) in the EGPA and lower (1±0.3 months) in the urticarial vasculitis group (Table 1).

Table 1: Distribution of vasculitis stratified by age, gender and disease duration (n=48)

Characteristics	Age in years (Mean SD)	Gender		Duration of disease in months (Mean SD)
		Male %	Female %	
CSVV*	24 (9.8)	45.0	55.0	8 (13.8)
PAN*	26 (9.8)	57.1	42.9	15 (17.6)
IgA vasculitis	21 (10.1)	50.0	50.0	3 (4.5)
GPA*	46 (7.0)	100.0	0.0	24 (31.6)
Levedoid Vasculopathy	32 (6.4)	25.0	75.0	19 (21.4)
EGPA*	42 (17.6)	33.3	66.7	64 (54.1)
Urticarial Vasculitis	27 (3.5)	0.0	100.0	1 (0.3)
Age of the Study Participants	Mean (SD) =29.0 (12.2) Years Median=30 Years			

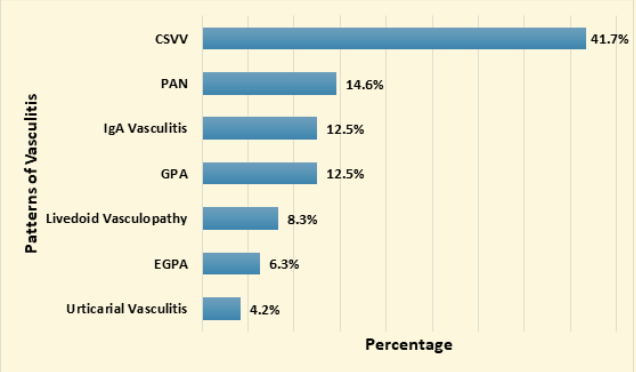

fig 1. Patterns of Vasculitis among the study participants (n=48)

*CSVV= Cutaneous Small Vessel Vasculitis; PAN= Polyarteritis Nodosa; GPA= Granulomatosis with Polyangiitis; EGPA= Eosinophilic Granulomatosis with Polyangiitis

Palpable purpura was present in all vasculitis patterns with variable frequencies. Urticaria was found in 100% of patients with urticarial vasculitis; a subcutaneous nodule was palpated in PAN (57.1%) and CSVV (10%); livedo reticularis was noticed in PAN (71.4%) and Livedoid Vasculopathy (25%); erythematous plaque was found in livedoid vasculopathy (75%), GPA(50%), and PAN (28.6%); hemorrhagic vesicles were observed in livedoid vasculopathy (50%) and PAN (14.3%); ulcers were found in all patients with livedoid vasculopathy and GPA, and in 85.7% of PAN patients. These results were statistically significant (Table 2).

Constitutional symptoms and involvement of the musculoskeletal system were observed in all patterns of vasculitis, with variable frequencies. GIT involvement was commonly seen in IgA vasculitis (66.7%); the nervous system was mostly (71.4%) affected by patients presenting with PAN; respiratory system involvement was a common presentation of EGPA (66.7%) and GPA (50%); sinusitis, nasal discharge, and hearing loss were found in 66.7% of patients with EGPA;eye changes were detected in 100% of patients with EGPA and 85.7% of patients with PAN. These results were statistically significant (Table 2).

Table 2: Clinical presentation of different patterns of vasculitis (n=48)

	CSVV*	PAN*	IgA vasculitis	GPA*	Leveoid Vasculo-pathy	EGPA*	Urticarial Vasculitis	P value
Cutaneous Presentation	%	%	%	%	%	%	%	
Palpable Purpura	95.0	57.1	100.0	50	25	66.7	100.0	0.01**
Urticaria	10.0	0.0	0.0	0.0	0.0	33.3	100.0	0.00**
Sub- cutaneous Nodule	10.0	57.1	0.0	0.0	0.0	0.0	0.0	0.01**
Livedo reticularis	5.0	71.4	0.0	0.0	25.0	0.0	0.0	0.00**
Erythematous plaque	15.0	28.6	0.0	50	75.0	0.0	0.0	0.04**
Hemorrhagic vesicle	0.0	14.3	0.0	0.0	50.0	0.0	0.0	0.01**
Ulcer	0.0	85.7	16.7	100	100	0.0	0.0	0.00**
Systemic Presentation								
Constitutional Symptoms (Fever, weight loss & fatigue)	20.0	100.0	33.3	83.3	25.0	66.7	100.0	0.00**
Musculoskeletal (Arthralgia & myalgia)	20.0	100.0	50.0	16.7	25.0	33.3	100.0	0.00**
GIT (Abdominal pain & bloody stool)	5.0	28.6	66.7	16.7	0.0	33.3	0.0	0.03**
Nervous System (Numbness, paresthesia, weakness of the limbs & headache)	5.0	71.4	0.0	0.0	25.0	0.0	0.0	0.06
Respiratory (Shortness of breath, wheeze, cough, chest pain & hemoptysis)	15.0	28.6	0.0	50.0	0.0	66.7	0.0	0.00**

*CSVV= Cutaneous Small Vessel Vasculitis; PAN= Polyarteritis Nodosa; GPA= Granulomatosis with Polyangiitis; EGPA= Eosinophilic Granulomatosis with Polyangiitis; **Statistically significant

Discussion

Vasculitis is a rare disorder, and related data are still lacking from various parts of the world, including the Indian subcontinent [15]. In the current study, CSVV was the leading variant (41.7%) of vasculitis affecting young adults, predominantly females. Bilateral palpable purpura were frequently observed (95%). The clinico-demographic findings of CSVV found in this study were in agreement with previous studies [5,6,7]. A multi-ethnic cohort study from the UK showed that the incidence of IgA vasculitis was higher in young people of Indian subcontinent origin than in Caucasians and Afro-Caribbeans [8]. In this study, patients with IgA vasculitis reflected the same age range, and their cutaneous and systemic characteristics were similar to those in a previous study [8].

Here, urticarial vasculitis is a less frequent variant of vasculitis, affecting mainly women, which is consistent with a recently published article [16]. Urticaria can also be a presenting feature of vasculitides; in the present study, it was observed in urticarial vasculitis, CSVV, and EGPA [17].

The higher frequency of PAN in comparison to GPA and EGPA and their male predominance in this study were a reflection of another previous study [18]. However, the recommended age group in this study was older than that in the present study. Patients with PAN may present with

palpable purpura, tender subcutaneous nodules, livedo reticularis, hemorrhagic bulla and ulcers [19]. These cutaneous findings were also observed in this study.

Livedo reticularis is an important cutaneous feature of PAN and ANCA-associated vasculitis [20]. In the present study, it was identified in CSVV, PAN and Livedoid vasculopathy. Necrotic ulcer is another striking feature of vasculitis, which was detected in the majority of patients with PAN and all patients with GPA in our study [13].Though the presence or absence of any particular cutaneous manifestation is not entirely specific to a particular ANCA type, some distinguishing patterns are common.

Conclusion

Cutaneous small-vessel vasculitis is the most common type of vasculitis observed in dermatological practice. Palpable purpura is the usual cutaneous presentation of every pattern of vasculitis. Urticaria and ulcers are the most common manifestations of urticarial vasculitis and granulomatosis with polyangiitis. Because cutaneous features can be present even before any obvious features of internal involvement, each cutaneous feature should be investigated in depth to reach a final diagnosis of vasculitis.

Statements

This study was conducted in accordance with the principles of the Declaration of Helsinki. The protocol was approved by the Institutional Review Board (IRB) of Bangabandhu Sheikh Mujib Medical University (Memo no: BSMMU/2016/10817).

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Statement of Ethics

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Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Conception and design: MSIB, FW, RN

Acquisition, analysis and interpretation of data: FW, MZS, KNS

Manuscript drafting and revising it critically: MSIB, FW, MZS, FA

Approval of the final version of the manuscript: MSIB, FW, MZS, and KNS

Guarantor accuracy and integrity of the work: MSIB, FW, MZS

Data Availability Statement

The data that support the findings of this study are openly available at MendeleyDOI:10.17632/m2rg66r88p.1. Further inquiries can be directed to the corresponding authors.

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