AIMDR

Original Research Article

https://doi.org/10.53339/aimdr.2026.12.3.1
E-ISSN: 2395-2822 | P-ISSN: 2395-2814

Clinical and Socio-Demographic Correlates of Filarial Hydrocele among Adult Males at a Tertiary Hospital in Northern Bangladesh

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Abstract

Introduction: Filarial hydrocele is a major cause of chronic morbidity among men in lymphatic filariasis–endemic regions, with considerable clinical and socioeconomic implications. Despite national elimination efforts, northern Bangladesh continues to report persistent filarial morbidity. The aim of the study is to assess the etiologic, clinical, and socio-demographic characteristics of filarial hydrocele among adult males attending a tertiary hospital in northern Bangladesh.

Methods: A prospective observational study was conducted among 100 consecutively enrolled adult males with newly diagnosed primary vaginal hydrocele at Rangpur Medical College Hospital from January to December 2014. Data were collected using a structured questionnaire and standardized operative assessment. Descriptive statistics summarized socio-demographic patterns, etiological distribution, laterality, and intraoperative findings.

Results: Definite filarial etiology accounted for 53% of cases, with an additional 30% categorized as highly likely or suspected. The cohort was predominantly young to middle-aged (mean age 33.65 years), rural (63%), and socioeconomically disadvantaged, with 77% classified as poor and 59% residing in kutcha houses. Unilateral hydrocele was common (88%), with right-sided predominance (57.95%). Lymphangiectasia was observed intraoperatively in 45% of patients, while 28% showed testicular abnormalities. Hydrocele volume was highest in bilateral cases (928 mL), followed by left-sided (426 mL) and right-sided (305 mL) disease.

Conclusion: Filarial hydrocele in northern Bangladesh predominantly affects men from poor, rural backgrounds and frequently presents with advanced lymphatic pathology. Strengthened morbidity-management services, improved sanitation, and targeted preventive strategies remain essential for reducing disease burden.

Keywords: Filarial hydrocele, lymphangiectasia, socio-demographic factors, lymphatic filariasis, hydrocelectomy

Introduction

Lymphatic filariasis (LF) remains one of the most disabling and poverty-linked neglected tropical diseases, posing a sustained challenge to global health even after two decades of elimination efforts. Caused primarily by *Wuchereria bancrofti*, the infection affects the lymphatic vessels and nodes, leading to a spectrum of chronic morbidities such as lymphoedema, elephantiasis,

and hydrocele. The World Health Organization (WHO) estimates that approximately 657 million people across 39 countries still live in areas requiring preventive chemotherapy, with nearly 25 million men affected by hydrocele and more than 15 million suffering from lymphoedema.[1] Despite considerable progress through the Global Programme to Eliminate Lymphatic Filariasis (GPELF), launched in 2000, LF continues to contribute significantly to disability-adjusted life years (DALYs) in many endemic regions. Between 1990 and 2021, an estimated 56.9 million people globally were living with LF, accounting for more than 1.3 million DALYs, a persistent reminder of the unfinished agenda toward morbidity control.[2]

Within the South and Southeast Asian region, LF remains concentrated in areas with limited sanitation, high poverty, and climatic conditions conducive to mosquito breeding.[3,4] Bangladesh, India, Myanmar, Nepal, and Indonesia together account for a major share of the regional burden, and despite the country's progress toward elimination, Bangladesh still reports thousands of chronic LF cases.[5] The Bangladesh National Filariasis Elimination Programme documented over 43,000 clinical cases in 19 endemic districts, including 12,824 hydrocele patients, highlighting the continued presence of LF morbidity long after transmission interruption campaigns.[5] Northern Bangladesh, in particular, has remained one of the historically endemic belts, where climatic factors, rural livelihoods, and socioeconomic deprivation continue to favor persistence of chronic disease.[6]

Among the chronic manifestations of LF, hydrocele is widely recognized as the most common and disabling condition in adult males.[7] Filarial hydrocele results from lymphatic obstruction and lymphangiectasia of scrotal vessels, producing accumulation of lymphatic fluid within the tunica vaginalis. The process is insidious, often beginning with asymptomatic lymphatic dilation before progressing to painful, disfiguring swelling that interferes with mobility, work, and sexual function.[8] Histopathological and operative studies have shown that chronic hydrocele fluid is largely of lymphatic rather than serous origin, often associated with dilated lymphatic channels and testicular damage.[9] This underscores the necessity for surgical intervention, typically total excision of the sac and closure of leaking lymphatic channels, over conservative management in endemic populations.

Beyond its physiological consequences, hydrocele carries a profound socioeconomic toll. In endemic rural communities, affected men frequently experience loss of productivity, social isolation, and psychological distress, further entrenching the link between LF and poverty.[7,10] Surgical treatment through hydrocelectomy has been demonstrated to be both clinically effective and highly cost-effective. A population-based analysis from Malawi reported an average cost of US$ 68 per surgery, restoring work capacity and yielding a benefit-to-cost ratio exceeding 24:1.[11] Post-surgical quality-of-life studies also demonstrate significant improvements across domains of mobility, self-care, and psychosocial well-being, reinforcing hydrocelectomy as a critical component of LF morbidity-management programs.[10]

Socio-demographic and environmental factors play a pivotal role in the occurrence and progression of LF morbidity, particularly hydrocele. Poverty, substandard housing, absence of sanitary toilets, and rural residence have been consistently associated with higher LF prevalence and severity.[5,12] In Bangladesh, household-level studies reveal that most hydrocele patients belong to lower socioeconomic strata and are engaged in occupations involving outdoor or night-time work, where vector exposure is frequent.[13] Poor sanitation, inadequate waste management, and stagnant water in peri-domestic environments facilitate mosquito breeding and perpetuate transmission. These factors intertwine with limited awareness and access to healthcare, delaying presentation to hospitals until advanced stages of disease.

Despite the availability of preventive chemotherapy and community interventions, hospital-based data continue to play a crucial role in understanding the residual morbidity burden. Operative series from endemic countries highlight that hydrocele surgery represents a significant component of the surgical workload, particularly in tertiary hospitals serving rural populations.[14,15] Studies from Africa and South Asia reveal that hydrocele cases often present with large, chronic lesions requiring complex repair, yet surgery under local anesthesia remains feasible and safe even in resource-limited settings.[16] Hospital-based observational studies are thus essential to delineate the clinical patterns, laterality, volume, and pathological correlates of filarial hydrocele in endemic regions, providing evidence that complements community-based surveillance.

In the context of Bangladesh, where hydrocele constitutes the predominant manifestation of LF morbidity among men in endemic districts, systematic hospital-based characterization of its clinical, demographic, and socio-environmental correlates remains limited. Most existing data derive from elimination-program surveillance rather than detailed surgical observation. To bridge this gap, the present study was conducted at a tertiary-care center in northern Bangladesh to assess the etiologic pattern of hydrocele, describe its clinical and operative spectrum, and identify the socio-demographic and environmental factors associated with filarial hydrocele among adult males.

Methods

This prospective observational study was conducted in the Department of Surgery at Rangpur Medical College Hospital, Bangladesh, over a 12-month period from January to December 2014. The study population consisted of all adult male patients presenting with newly diagnosed vaginal hydrocele who attended the outpatient department or were admitted to the general surgery wards for operative management. A total of 100 patients were enrolled, following a random sampling approach, as no reliable national prevalence data were available to guide formal sample-size calculation. Eligibility criteria included adult males with unilateral or bilateral primary vaginal hydrocele. Patients with other secondary causes of hydrocele or known recurrent filarial hydrocele were excluded to ensure etiological specificity of observations. Data were collected using a structured, pre-tested questionnaire administered by a trained team under supervision of a consultant-level surgeon. The instrument captured socio-demographic variables (age, religion, residence, housing type, sanitation status, marital status, education, occupation, and socioeconomic class), detailed clinical history, physical-examination findings, and relevant laboratory and immunoassay information. Diagnostic confirmation and etiological categorization (definite, highly likely, suspected, or non-filarial) were based on clinical assessment and available parasitological or immunological indicators. All patients underwent standard operative evaluation, and intraoperative findings—including presence of lymphangiectasia, testicular abnormalities, and hydrocele fluid volume—were documented systematically. Hydrocele volume was measured separately for right-sided, left-sided, and bilateral cases using calibrated suction apparatus. Data quality assurance included development of a work manual, field testing of the questionnaire, and daily review of collected forms to identify inconsistencies or missing values. Ethical approval was obtained from the institutional ethical committee of Rangpur Medical College Hospital, and written informed consent was secured from all participants, who were permitted to withdraw at any stage without consequence. Data were entered, cleaned, and analyzed using SPSS version 17.0. Descriptive statistics (frequency and percentage) were used for categorical variables, while continuous variables were summarized using mean and standard deviation. Because the sample size was fixed at 100, frequencies numerically corresponded to percentages for ease of interpretation. Results were organized in tables and figures to depict socio-demographic patterns, etiological distribution, and operative findings.

Results

Table 1 shows that more than half of the patients (53%) had hydrocele due to definite filarial etiology, while an additional 30% fell into highly likely or suspected filarial categories. Only 17% of cases were classified as non-filarial.

Table 2 shows that the study population was predominantly young to middle-aged, with most participants between 31 and 40 years and a mean age of 33.65 years. The majority lived in rural areas (63%), in kutcha households (59%), and under poor sanitation conditions (78%). Most participants were Muslim (69%) and worked in low-income occupations, particularly the biri industry (51%). Socioeconomic status was largely poor or lower-middle class (96%).

Table 3 indicates that most hydroceles were unilateral (88%), with right-sided involvement more common than left among these cases. Lymphangiectasia was observed intraoperatively in nearly half of the patients (45%), while testicular abnormalities were noted in 28%.

Figure 1 shows that mean hydrocele volume was higher on the left side (426 mL) compared to the right (305 mL), while bilateral cases had substantially larger fluid accumulation, averaging 928 mL.

Discussion

The present study provides an updated hospital-based perspective on the clinical and socio-demographic profile of filarial hydrocele among adult males in northern Bangladesh. The predominance of filarial etiology (53%) among hydrocele patients supports the continuing burden of lymphatic filariasis (LF) morbidity in endemic areas despite national elimination efforts. Similar

Table 1: Etiologic classification of vaginal hydrocele (n = 100)

Etiologic category	Frequency (n)	Percentage (%)
Definite filarial	53	53
Highly likely filarial	10	10
Suspected filarial	20	20
Non-filarial	17	17

Table 2: Socio-demographic characteristics of the study population (n = 100)

Category	n (%)
Age group (years)	
18–30	28 (28)
31–40	41 (41)
41–50	19 (19)
51–60	7 (7)
>60	5 (5)
Mean age	33.65 ± 8.83 years
Residence	
Rural	63 (63)
Urban	37 (37)
Housing type	
Kutcha	59 (59)
Semi-pucca	29 (29)
Pucca	12 (12)
Sanitation status	
Poor	78 (78)
Good	20 (20)
Very good	2 (2)
Religion	
Muslim	69 (69)
Hindu	30 (30)
Christian	1 (1)
Occupation	
Biri industry	51 (51)
Business	18 (18)
Student	11 (11)
Farmer	10 (10)
Others	10 (10)
Socioeconomic class	
Poor	77 (77)
Lower-middle	19 (19)
Middle	3 (3)
Rich	1 (1)

Table 3: Clinical laterality and operative findings (*n* = 100)

Category	*n* (%)
Laterality	
Unilateral	88 (88)
Bilateral	12 (12)
Side (unilateral only, *n* = 88)	
Right	57.95%
Left	42.04%
Operative findings	
Lymphangiectasia	45 (45)
Testicular abnormalities	28 (28)

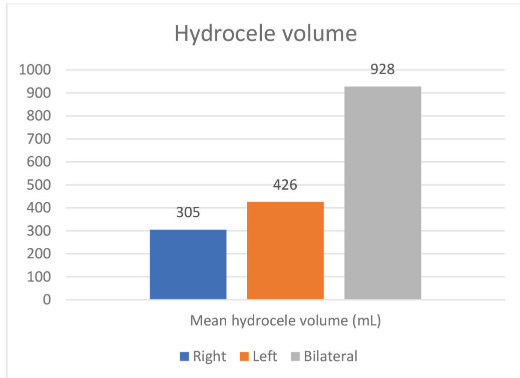

Figure 1: Distribution of hydrocele volume by side.

findings have been reported from other South Asian endemic regions, where a large proportion of hydrocele cases were attributable to *Wuchereria bancrofti* infection, reflecting persistent microfilarial circulation and incomplete interruption of transmission.[5,12] The high proportion of definite and suspected filarial cases observed in this study thus aligns with regional data and highlights the need to sustain integrated morbidity-management activities alongside mass drug administration programs.

The age distribution in the present cohort, concentrated between 31 and 40 years with a mean age of 33.65 years, indicates that hydrocele primarily affects men in their most productive years. Comparable observations have been made in India and Nigeria, where middle-aged males constitute the majority of LF morbidity cases due to prolonged exposure and delayed manifestation of chronic infection.[12,17] This age pattern underscores the socioeconomic cost of the disease, as it predominantly affects individuals actively engaged in manual labor, reinforcing the poverty–LF cycle.

Consistent with global LF epidemiology, this study found that 63% of hydrocele patients resided in rural areas, with 59% living in kutcha houses and 78% reporting poor sanitation. Rural clustering of LF morbidity has been widely documented, attributed to inadequate sanitation, lack of vector-control measures, and limited health-service access.[5,18] Poor housing and sanitation conditions promote mosquito breeding, while low-income settings impede early detection and treatment, leading to chronic manifestations such as hydrocele. These findings affirm the environmental and socioeconomic underpinnings of LF persistence and support the WHO's recommendation to integrate hygiene and poverty-alleviation strategies with ongoing elimination programs.

Occupational data in this series revealed that 51% of patients worked in the biri industry, followed by business (18%) and agriculture-related labor (10%), illustrating the predominance of low-income, labor-intensive occupations. Similar associations between LF morbidity and manual labor have been reported in both African and Asian contexts, where affected individuals experience work absenteeism, productivity loss, and diminished earning potential.[11,17] The strong link between poverty, occupation, and hydrocele seen in this study further supports the notion that LF is a disease of deprivation, sustained by economic and environmental vulnerability.

Clinically, hydrocele was predominantly unilateral (88%), with right-sided involvement more common than left (57.95% vs. 42.04%),

findings that are comparable to previous surgical series describing unilateral predominance in endemic hydrocele cohorts.[14] Bilateral hydroceles constituted 12% of cases, consistent with reports from similar hospital-based studies in tropical regions. The intraoperative presence of lymphangiectasia in 45% of cases confirms chronic lymphatic obstruction as a key pathophysiological mechanism, echoing histopathologic evidence that lymphatic leakage and vessel dilatation drive hydrocele formation.[9] The observed testicular abnormalities in 28% of patients also correspond to previous reports of testicular involvement secondary to lymphatic dysfunction and prolonged hydrocele pressure.[9]

Hydrocele fluid volume showed a clear gradient by laterality, with larger mean volumes on the left side (426 mL) than on the right (305 mL), and the greatest accumulation in bilateral cases (928 mL). While few studies have quantified hydrocele volume by side, comparable trends have been described in advanced or longstanding filarial hydroceles, where chronic lymphatic obstruction leads to progressive fluid accumulation and scrotal deformity.[16] The markedly higher volumes in bilateral disease emphasize the importance of early surgical intervention to prevent complications and progressive disability.

Taken together, these findings depict a characteristic profile of filarial hydrocele in northern Bangladesh—adult men of low socioeconomic background, primarily from rural areas, presenting with unilateral disease and significant intraoperative lymphatic pathology. This study corroborates regional data linking LF morbidity with poverty and environmental disadvantage while adding novel operative and laterality insights to the literature. The persistence of filarial hydrocele despite elimination efforts underscores the need for sustained morbidity management, surgical capacity strengthening, and community-based prevention strategies to reduce residual LF burden in endemic settings.

Limitations of the Study

This study was conducted in a single tertiary hospital and therefore may not fully represent the broader hydrocele burden across all endemic districts. The absence of advanced diagnostic modalities, such as antigen detection or ultrasonography for all patients, may have led to underestimation or misclassification of filarial etiology. As the sample size was fixed at 100 and based on purposive clinical attendance, the findings may be influenced by selection bias. Additionally, the cross-sectional design limits the ability to assess long-term surgical outcomes or recurrence patterns.

Conclusion

The study demonstrates that filarial hydrocele remains a significant clinical and socioeconomic problem among adult males in northern Bangladesh. Most patients presented with unilateral disease, marked lymphatic pathology, and substantial hydrocele volume, highlighting chronic lymphatic obstruction as the principal mechanism. The predominance of rural residence, poor sanitation, low-income occupations, and poverty underscores the persistent environmental and socioeconomic vulnerabilities that facilitate LF morbidity in endemic communities. These findings reinforce the need for continued morbidity-management services, strengthened surgical capacity, and integrated public health interventions to address the residual burden of filarial hydrocele in Bangladesh.

Recommendation

Scalable morbidity-management programs should be prioritized to ensure timely hydrocelectomy services, particularly for underserved rural populations. Public health strategies integrating vector control, sanitation improvement, and poverty-alleviation initiatives are essential for reducing

ongoing LF transmission risks. Routine training of surgical teams on standardized hydrocele classification and operative techniques would further enhance service quality. Future research should explore long-term surgical outcomes, recurrence rates, and the role of targeted community interventions in reducing late-stage presentations.

Ethical Approval

The study was approved by the Institutional Ethics Committee.

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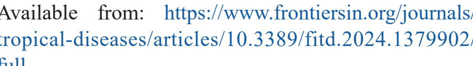

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How to cite this article: Islam MS, Rahman H, Alam MS, Rahman MM, Shakir EMN, Rahman SB. Clinical and Socio-Demographic Correlates of Filarial Hydrocele among Adult Males at a Tertiary Hospital in Northern Bangladesh. Ann. Int. Med. Den. Res. 2026;12(3):1–8.

Source of Support: Nil, **Conflict of Interest:** None declared.

Received: 02-Mar-26; **Revised:** 20-Apr-26;
Acceptance: 05-May-26; **Published:** 30-Jun-26