



Original Article

Understanding the Epidemiology of Labial Adhesion among Paediatric Age-groups in Bangladesh: A Single-center Cross-Sectional Study

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Abstract

Background: Labial adhesion (LA) is the most frequently encountered medical condition in paediatric surgery clinics among prepubertal girls. The highest incidence of LA occurs in toddler age groups, specifically between 1 and 3 years of age. This condition is usually asymptomatic and often arises without any other pathology affecting the upper genital tract.

Objective: The aim of this study is to fill the gap in epidemiological data by investigating the prevalence, age at presentation, and patterns of labial adhesion among paediatric age groups in Bangladesh.

Methods: A total of 345 cases of LA were seen during the study period on paediatric patients from 2017 to 2024 in a private care setting in Chattogram, Bangladesh. A comprehensive semi-structured questionnaire was

used to collect sociodemographic information related to age, age groups, place of living, family history of LA, primary identifier, and referral system. Types of labial adhesion, clinical presentations, and associated anomalies were included as clinical questions in the questionnaire, ensuring a thorough data collection process. Data were analyzed using Microsoft Excel.

Results: A descriptive analysis involving 345 paediatric patients presented the prevalence and pattern of LA across different age groups. The mean age of participants was 29 months (± 7 months). The majority of patients were in the toddler group (39.13%), followed by infants (32.75%) and older children (28.12%). The most frequent cases were observed in urban areas (54.2%). The most prevalent type of LA was complete adhesion, which represented 97.67% of cases, particularly among toddlers (41.67%). Furthermore, recurrence of LA was observed in 10.14% of patients, predominantly in older children.

Conclusion: This study highlighted the distribution and patterns of labial adhesion, revealing a higher prevalence among toddlers and in urban areas. Complete labial adhesion was identified as the most common type.

Key words: Labial adhesion, age distributions, complete and partial adhesion, recurrence, prevalence, clinical presentations.

Introduction

Labial Adhesion (LA), also termed as labial fusion or labial agglutination, is a commonly undiagnosed condition found in pre-pubertal girls.¹ It occurs due to the complete or partial fusion of the adherence of the labia minora or majora in the midline through dense or flimsy adhesions.^{1,2} It is usually not found at birth but is thought to arise during the re-epithelization of micro-damaged hypo-estrogenized labial skin.³ Parents should be aware of this condition and its symptoms to ensure early detection and appropriate management.

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The prevalence of labial adhesion can vary across different populations and healthcare settings. It is essential to note that labial fusion is common, especially in the paediatric population, although its prevalence is often uncertain due to its asymptomatic nature.^{4,5} For instance, a study by Leung et al. found that thirty-five children (1.8%) were diagnosed with labial adhesion at a paediatric outpatient clinic, with the highest incidence occurring between 13 and 23 months of age.⁶ In developing countries, around 2% of pre-pubertal girls aged between 3 months and 6 years have also been reported to experience this condition.³ Further study showed the prevalence of labial adhesion between the ages of 2 months to 14 years.⁷

Labial Adhesion is a benign gynecological condition which can be seen as one of the most common causes of presentations to paediatric surgery clinics among pre-pubertal girls.^{8,9} While the exact cause of labial adhesion is still unknown, this condition is assumed to occur due to the inflammation of the labia in a low-estrogen environment.¹⁰ It is usually not found at birth and is thought to be caused by a hypoestrogenic state, as it is extremely rare in the neonatal period due to maternal estrogen.³ Likewise, the condition is unusual throughout the reproductive phase when estrogen is sufficiently maintained.^{3,10} Infections and poor hygiene, particularly stool contamination, may also trigger the condition.⁸

Complete labial adhesion may be defined as the presence of a midline raphe or a line of fusion joining the labial folds with a small opening remaining for urine to exit.^{2,11} Meanwhile, partial labial adhesion remains the partial thickening of labial folds in the midline with a visible space between them (Fig. 1).^{2,11}

Labial adhesion mostly affects 2% of young pre-pubertal girls, is most commonly observed between the ages of 3 months and 6 years, with a peak incidence at 1 to 23 months.^{3,10} Retrieving data related to the true incidence rate of labial adhesion is a bit challenging due to its asymptomatic nature.⁵ However, it is important to note that this condition can be diagnosed incidentally during routine examinations [10]. It is sometimes associated with complaints such as post-void dripping, vaginal discharge, irritation, dysuria, hematuria, local inflammation or trauma to the labial area, and threadworm infestations.^{3,5,10}

Literature searches did not yield any information on the epidemiological distribution of labial adhesion in Bangladesh. A study conducted in Bangladesh primarily focused on the treatment of labial adhesion and evaluated the effectiveness of topical betamethasone (90%) and estrogen cream, but it did not provide insights into the burden of the disease.¹² To the best of our knowledge, this is the first study examining the prevalence of labial adhesion

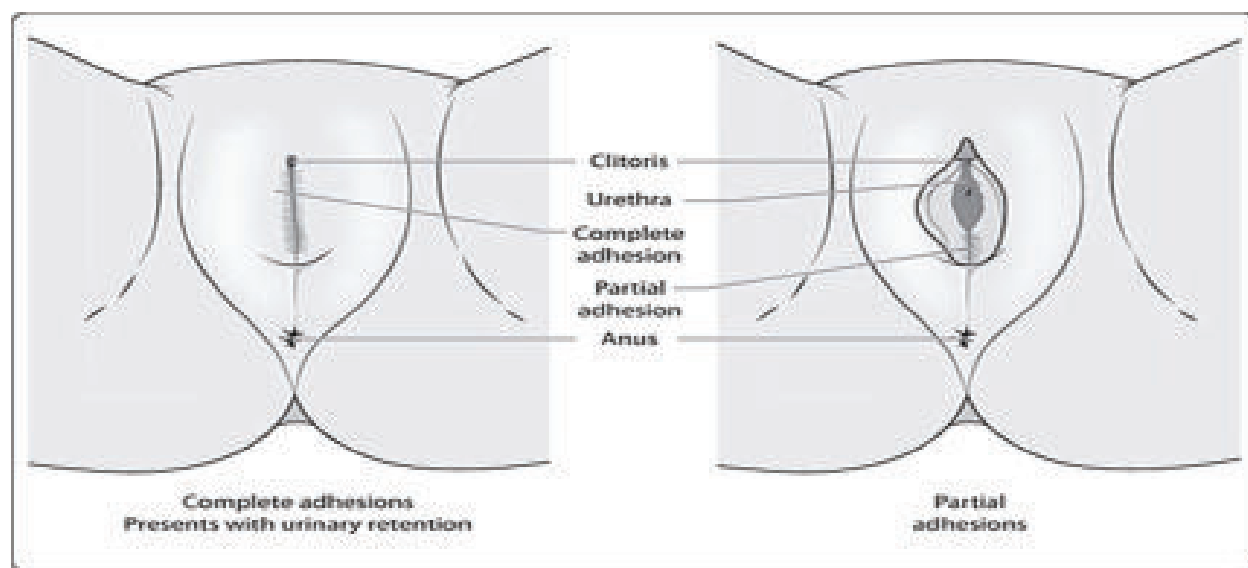


Fig.-1: Anatomical variation in complete and partial labial adhesions.

in Bangladesh. Our aim is to address the gap in epidemiological data by investigating the prevalence, age at presentation, and patterns of labial adhesion among paediatric populations in Bangladesh.

Methods & Materials:

Study Design & Data Source: It was a descriptive cross-sectional study conducted on paediatric patients with labial adhesion from 2017 to 2024 in a private care setting in Chattogram, Bangladesh.

Study Population & Selection Criteria: The study included all the patients of the paediatric age group, such as infants (> 28 days- 1 year), toddlers (>1year-3year), and children (> 3 years- 12 years) diagnosed with labial adhesion. A total of 345 patients were diagnosed at our center during the study period. A single paediatric surgeon diagnosed all of them. The inclusion criteria include all patients diagnosed with labial adhesion in paediatric age groups. Female patients above 12 years of age with labial adhesion, other conditions that might affect female genitalia, and uncooperative patients were excluded from the study.

Study instrument: A semi-structured questionnaire included sociodemographic information related to age, age groups, place of living, family history of LA, primary identifier, and referral system. Types of labial adhesion, clinical presentations, and associated anomalies were included as clinical questions in the questionnaire.

Statistical Analysis: Data were analyzed using Microsoft Excel. Categorical data were presented as frequency and percentage, and continuous data as mean and standard deviation.

Ethical Consideration: The study was approved by the Ethical Review Committee of Chittagong Medical College (Memo No: CMC/PG/2021/163).

Results

A descriptive analysis was conducted on 345 paediatric patients to determine the prevalence of labial adhesion, the age at which it presents, clinical presentations, associated abnormalities, and the patterns of labial adhesion across different age groups. Participants ranged widely in age, with a mean age of 29 months ($\pm$ 7 months). Among the age categories, 135 respondents (39.13%) were in the toddler group (ages greater than 1 year to 3 years), followed by 113 infants (32.75%) and 97 children (28.12%). Most patients diagnosed with labial adhesion (54.2%) were from urban areas, while the remaining 45.79% were from rural areas.

Due to the asymptomatic nature of the disease, the majority of the cases (80.29%) were identified during medical checkups, followed by 19.1% diagnosed by

any of the family members. Parents reported labial adhesion in 14.78% of respondents; more than two-thirds of the respondents (253) were referred to our center by other clinicians, while others were referred by relatives (4.93%) or by hospital OPDs (6.96%). Among the study population, 310 cases were newly diagnosed, and 35 cases had received treatment at least once and came to our center with recurrent labial adhesion. In the newly diagnosed cases, most cases (300) were found to have complete labial adhesion, and the rest had partial.

Table 1: Demographics of the study participants (N=345)

Characteristics	Number	%
Age (Mean$\pm$SD) in months	29 ($\pm$ 7)	
Age Groups		
• Infant (29 days to 1 year)	113	32.75%
• Toddler (>1 year-3 years)	135	39.13%
• Children (>3 years-12years)	97	28.12%
Place of Living		
• Rural	158	45.79%
• Urban	187	54.20%
Primary Identifier		
• Family Members	68	19.71%
• Noticed on a medical checkup	277	80.29%
Positive Family History of Labial Adhesion		
• Yes	14	4.06%
• No	331	95.94%
Source of Referral		
• Parents	51	14.78%
• Referred by Relatives	17	4.93%
• Referred by Clinicians	253	73.33%
• Referred by Hospital OPD	24	6.96%
H/O Burn or Trauma around the perineum	2	0.57%
Poor perineal hygiene	65	18.84%
Diaper use	243	70.43%
Pattern of Labial Adhesion		
• Newly Diagnosed	310	(89.86 %)
Complete	300	97.67%
Partial	10	3.23%
• Recurrent	35	10.14%
Associated Anomalies		
• Yes	36	10.43%
• No	309	89.57%

N= Number of observations among study participants;
SD= Standard Deviation

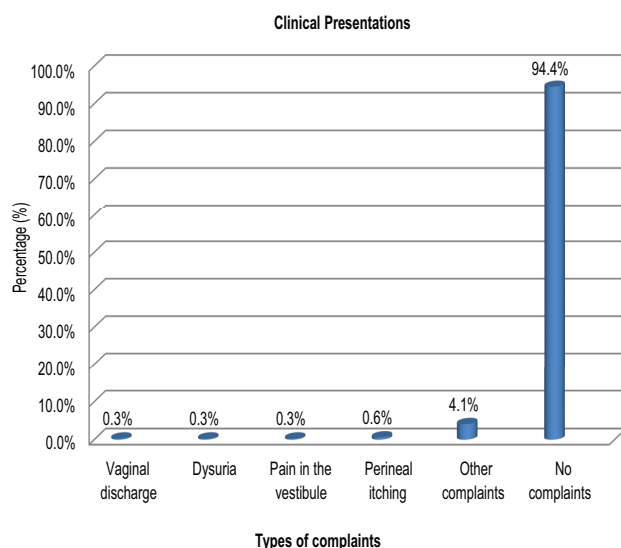


Fig.-2: Types of Clinical Presentations

Fig. 2: Describes the variations in clinical presentations of the disease.

Most patients were asymptomatic or had no complaints (94.4%); the others were presented with complaints such as perineal itching (0.6%), dysuria (0.3%), vestibular pain (0.3%), vaginal discharge (0.3%), and some other complaints (4.1%).

The bar plot in Figure 3 indicates the associated anomalies found during diagnosis in our study participants. A total of 36 patients reported having various associated anomalies, including dermatological diseases (8 cases), anal fissure (7 cases), urogenital anomalies (4 cases), threadworm infestation (3 cases), urinary tract infections (3 cases), hernia (3 cases), haemangioma over the

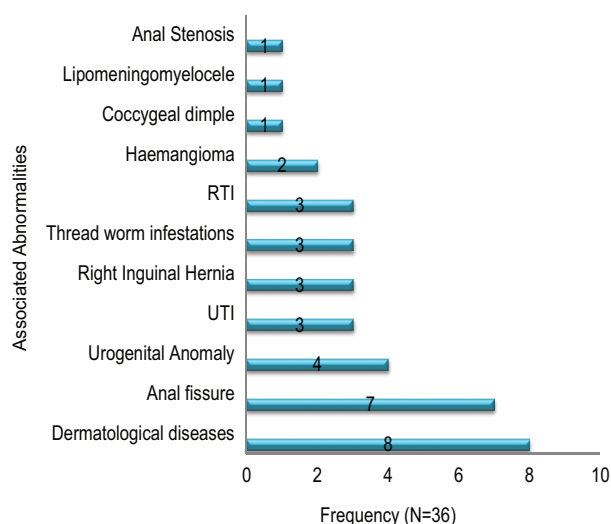


Fig.-3: Showing prevalence of associated anomalies along with labial adhesion.

perineum (2 cases), lipomeningomyelocele (1 case), and anal stenosis (1 case).

Table 2 provides the distribution of different types of labial adhesion at different age groups. The distribution of labial adhesion varied across different age groups. The majority of toddlers (41.67%) were diagnosed with complete labial adhesion, followed by infants (35.33%) and children (23%). Partial labial adhesion was relatively rare, with only a few cases reported in each group: two in infants, five in toddlers, and three in children. In contrast, recurrent labial adhesions were more common in children (25 cases), compared to newly diagnosed patients.

Table II: Distribution of different types of labial adhesion across age groups.

Pattern of Labial Adhesion	Infant (>28days-1year) Frequency (%)	Toddler (>1year-3year) Frequency (%)	Children (>3year-12year) Frequency (%)
Complete	106 (35.33 %)	125 (41.67 %)	69 (23 %)
Partial	2 (20 %)	5 (50 %)	3 (30 %)
Recurrent	5 (14.29 %)	5 (14.29 %)	25 (71.42 %)

Discussion

The worldwide prevalence of labial adhesion has been reported to be 2%.¹³ Understanding its epidemiological characteristics—such as age distribution, family history, living conditions, clinical presentation, and associated abnormalities—is essential for improving early diagnosis and implementing preventive measures. The exact cause and accurate incidence rate of labial adhesion remain unclear.⁷ Therefore, our study aims to address this knowledge gap by assessing the prevalence and recurrence patterns of labial adhesion among pediatric age groups in Bangladesh. This research has the potential to impact pediatric health and care significantly.

There is an ongoing debate about the peak age of occurrence of labial adhesion.⁶ Our findings indicate that the highest prevalence (39.13%) occurs in patients aged between 1 and 3 years. This frequency of labial adhesion in our study settings seems consistent with several previous studies on labial adhesion.¹⁴ We also observed that toddlers have the most extensive presentation of complete adherence to labial folds. As estrogen levels remain low in younger girls, this suggests that early childhood or pre-pubertal age may be critical for labial adhesion.^{2,3} However, labial adhesion is extremely rare at birth, similar to our study findings, as we also didn't find any case in the neonatal age group.⁶

Additionally, most of our participants (54.20%) belong to urban areas, which is the opposite of the studies in Egypt and India, exhibiting higher prevalence in rural areas.^{15,16} This discrepancy could be attributed to various factors, such as better access to healthcare in urban areas, transportation challenges in rural settings, and greater awareness among urban parents regarding both mild and severe symptoms.¹⁶ Moreover, our study focused on urban-based private healthcare settings, which could contribute to increased urban presentations. Again, strongly perfumed soaps, diapers, and antiseptic wipes are more common in urban areas, which may lead to perineal skin infection, contributing to labial adhesion.^{17,18} Poor perineal hygiene can also lead to inflammation, which may erode the epithelium of the labia minora.¹⁹ When this erosion occurs, especially in the absence of estrogen, it can cause the labia minora to fuse in the midline.¹⁹ Another possible consequence is stool contamination of the vulva, which can result in vulvovaginitis and further inflammation.¹⁹ Our study found that 18.84% of

participants had difficulty maintaining proper personal hygiene. However, with appropriate attention to hygiene, these issues can be resolved, potentially preventing the formation of adhesions.

In our study, we found that a positive family history was documented in 4.06% of the cases. The majority of patients (277 out of 345) were diagnosed during routine medical checkups. In contrast, Kathpalia SK et al. reported that 60% of cases were brought to a physician's attention after being noticed by their parents.²⁰ Another study indicated that parents often made incidental findings while bathing or changing their children.²¹ This comparison underscores the importance of routine medical checkups for young girls, as well as the need for parental counseling to facilitate early detection and reduce complications related to labial adhesion.

Labial adhesion is usually asymptomatic and no such laboratory tests are necessary to confirm the diagnosis.^{3,6} However, in symptomatic cases, individuals may experience inflammation of the affected area, post-void dripping of urine, dysuria (painful urination), hematuria (blood in urine), urinary retention, vaginitis, fibrosis, and rarely, infertility.^{3,18,20} Our findings indicate a very low incidence of symptomatic cases: perineal itching occurred in 0.6% of patients, dysuria in 0.3%, vestibular pain in 0.3%, and vaginal discharge in 0.3%. Additionally, 4.1% of cases presented with other symptoms. It is important to note that labial adhesion is not a congenital disorder, but it may be associated with genital and urinary abnormalities in some individuals.^{18,20} Among the affected patients, approximately 36 had varying associated anomalies, including dermatological diseases (8 cases), anal fissure (7 cases), urogenital anomalies (4 cases), threadworm infestation (3 cases), urinary tract infections (3 cases), hernia (3 cases), haemangioma over the perineum (2 cases), lipomeningomyelocele (1 case), and anal stenosis (1 case). Recognizing these associated anomalies is crucial, as they can significantly affect the condition. Therefore, a more comprehensive clinical assessment is essential.

Asymptomatic labial adhesion typically resolves with conservative treatment, and surgical intervention is often unnecessary.^{18,21} However, it's important to note that recurrence is a common occurrence until the patient reaches puberty.^{19,22} Surprisingly, our study did not find a significant association between age group

and recurrence rate; we identified recurrent cases incidentally throughout the study period. A separate study reported a low recurrence rate, with a median of 3.5 months post-surgical correction.²² However, our study did not focus on the treatment modalities of labial adhesion.

Strengths and Limitations

Our study, the first of its kind in Bangladesh, provides detailed epidemiological data on labial adhesion. It underscores the urgent need for routine medical checkups of pre-pubertal girls and the early identification of any associated anomalies that could worsen the condition. However, the study's design limits its ability to establish a cause-and-effect relationship. Conducted in an urban-based private healthcare center, the study may not fully represent the prevalence in rural areas. The incidental reporting of recurrent cases further hampers our ability to establish the association between age and other factors. Nevertheless, our findings serve as a guide for future researchers, directing them to develop more robust study designs to explore additional associated factors and treatment options in low-resource settings.

Conclusion

This cross-sectional study highlighted the distribution and patterns of labial adhesion. A significant number of cases were found to be isolated, with most being diagnosed as complete labial adhesion. Our findings revealed a higher prevalence in urban areas, possibly due to factors such as healthcare access or lifestyle choices. Our study emphasized the need for early diagnosis and awareness among caregivers. Further longitudinal studies with a larger sample size can be done to evaluate its risk factors and effective preventive measures to avoid its recurrence.

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