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Original Research Article

Screening the Prevalence of Bladder and Bowel Dysfunction among Children Attending Outpatient Department in a Tertiary Care Centre: A Cross-Sectional Study

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Abstract

Background: Bladder and Bowel Dysfunction (BBD) is a common yet underdiagnosed condition in pediatric populations, characterized by the coexistence of lower urinary tract symptoms (LUTS) and functional bowel disorders such as constipation. BBD significantly impacts children's quality of life, leading to complications including recurrent urinary tract infections (UTIs), vesicoureteral reflux (VUR), renal scarring, and psychosocial distress. Despite its high prevalence, BBD remains poorly understood, with gaps in standardized diagnostic criteria and management strategies.

Objective: This study aims to determine the prevalence, clinical characteristics, and associated risk factors of BBD in children. It evaluates the correlation between voiding dysfunction (Dysfunctional Voiding Scoring System [DVSS]) and constipation severity (Constipation Scoring System [CSS]) while identifying key demographic and physiological predictors of BBD. The study also seeks to develop an evidence-based framework for early detection and intervention.

Methods: A cross-sectional observational study was conducted at Nandha Medical College and Hospital, Erode, involving 537 children aged 3 to 12 years. Participants were assessed using validated screening tools, including the DVSS and CSS. Clinical history, anthropometric measurements, systemic examination findings, and laboratory tests were collected. Data were analyzed using descriptive statistics, chi-square tests, t-tests, correlation analysis, and multivariate logistic regression to determine associations and risk factors.

Results: BBD was diagnosed in 30.4% of children. Prevalence was higher in females (33.57%) than males (26.77%), though not statistically significant (p=0.320). The highest BBD prevalence was observed in children aged 9–12 years (34.09%), followed by 3–5 years (29.59%) and 6–8 years (25.68%) (p=0.004). Higher BMI was significantly associated with BBD ($p < 0.0001$). A significant positive correlation ($r = 0.462$, $p < 0.001$) was found between DVSS and constipation scores. Multivariate analysis identified higher DVSS scores (OR=2.36, p<0.001), constipation severity (OR=1.89, p<0.001), and BMI (OR=1.42, p=0.018) as independent risk factors for BBD.

Conclusion: This study confirms that BBD is a significant pediatric health concern, affecting nearly one-third of children. The strong correlation between bladder and bowel dysfunction underscores the need for integrated diagnostic and therapeutic approaches. Early screening, lifestyle modifications, and multidisciplinary interventions are recommended to improve clinical outcomes.

Keywords: Bladder and Bowel Dysfunction; Pediatric Urology; Constipation; Dysfunctional Voiding; Urinary Incontinence; Voiding Dysfunction; Risk Factors.

Introduction

Bladder and bowel dysfunction (BBD) in children is a multifaceted condition characterized by the concurrent presence of lower urinary tract symptoms (LUTS) and functional bowel disorders such as constipation or encopresis. BBD is a prevalent yet frequently overlooked condition that can significantly impact a child's quality of life, leading to both short- and long-term complications, including recurrent urinary tract infections (UTIs), vesicoureteral reflux (VUR), renal scarring, and

even psychological distress [1,2]. This dysfunction results from an intricate relationship between the bladder and bowel due to their shared innervation and pelvic floor musculature. The pathophysiology of BBD involves inappropriate coordination of detrusor muscle activity, urinary sphincter relaxation, and bowel function [3]. The co-occurrence of bladder and bowel symptoms in children has gained increasing attention, with studies demonstrating significant overlap between pediatric LUTS and constipation [4]. Addressing BBD is crucial, as untreated cases can lead to prolonged morbidity, diminished academic performance, and poor psychosocial well-being [5].

The prevalence of BBD varies based on study methodologies, population demographics, and diagnostic criteria, with estimates suggesting 10–25% of school-aged children exhibit symptoms [6]. In India, data on BBD prevalence remains scarce, but smaller studies highlight its significance, reporting rates of enuresis (4.7%), non-monosymptomatic enuresis (2.1%), overactive bladder (2.6%), and dysfunctional voiding (2.2%) [7]. Factors such as limited public awareness, social stigma, and lack of structured interventions contribute to underreporting [8].

This review discusses the epidemiology, global and Indian prevalence of BBD, its pathophysiology, clinical presentation, diagnostic approaches, and current treatment strategies, including behavioral interventions and pharmacological options. Additionally, we explore research gaps and highlight the need for standardized diagnostic and management approaches.

Aim and Objectives

Aim of the Study: The primary aim of this study is to evaluate the prevalence, clinical characteristics, and risk factors associated with Bladder and Bowel Dysfunction (BBD) in children. This research seeks to identify the interrelationship between voiding dysfunction and constipation, assess demographic and physiological predictors of BBD, and establish evidence-based management strategies to improve clinical outcomes for affected children [9].

Objectives of the Study

Primary Objectives:

1. To determine the prevalence of BBD in children aged 3 to 12 years using clinical criteria and validated scoring tools.
2. To assess the association between dysfunctional voiding (DVSS) and constipation severity (CSS) and its impact on BBD diagnosis.
3. To identify key demographic, clinical, and physiological risk factors contributing to BBD, including age, gender, BMI, and systemic examination findings.
4. To analyze the impact of constipation on urinary symptoms and establish the correlation between voiding dysfunction and bowel dysfunction.
5. To evaluate the effectiveness of standardized screening tools (DVSS and CSS) in identifying children at risk for BBD.

Secondary Objectives: 6. To compare BBD prevalence across different age groups (3-5 years, 6-8 years, 9-12 years) and evaluate whether symptom resolution occurs with increasing age. 7. To assess gender-based differences in BBD prevalence and severity, determining if there is a higher predisposition among males or females. 8. To perform multivariate logistic regression analysis to quantify the odds of BBD based on clinical and demographic parameters. 9. To develop a schematic diagnostic and management algorithm for children with suspected BBD based on study findings. 10. To provide clinical recommendations for early detection and integrated management of BBD, minimizing long-term complications.

Methodology

This study was designed as a cross-sectional, observational study aimed at evaluating the prevalence, clinical characteristics, and risk factors associated with BBD in children. The research was conducted at Nandha Medical College and Hospital, Erode, a tertiary care centre, where children presenting with symptoms of urinary and bowel dysfunction were assessed. The study period spanned February 2023 to September 2023, during which 537 children aged 3 to 12 years were recruited [10].

Study Population and Participant Selection: Participants were enrolled based on defined inclusion and exclusion criteria. Inclusion criteria: Children aged 3 to 12 years presenting with symptoms suggestive of BBD; caregivers provided informed consent; no prior diagnosis of neurological disorders. Exclusion criteria: Anatomical or neurological abnormalities; chronic systemic illnesses; medications affecting bladder or bowel function [11].

Data Collection Procedures: Data were collected through structured caregiver interviews, validated scoring tools, and physical examinations. Domains assessed included demographic data (age, gender, BMI), clinical history (UTI, enuresis), and systemic examination [12].

Assessment Tools

- **DVSS:** 10-item questionnaire scored 0-3; higher scores indicate greater severity [24].
- **CSS:** Parameters include stool frequency, consistency; categorized as normal (<5), mild (5-8), moderate (9-12), severe (>12) [13].

Diagnostic Criteria: BBD diagnosed if at least one urinary and one bowel symptom present [14].

Statistical Analysis: Data analyzed using SPSS (version 26) and R (version 4.5.0). Descriptive statistics, t-tests, chi-square tests, Pearson's correlation, and multivariate logistic regression were employed ($p<0.05$ significant) [15].

Ethical Considerations: Approved by the Institutional Ethics Committee of Nandha Medical College and Hospital, Erode. Informed consent obtained; anonymity maintained [16].

A total of 537 children were included. Mean age: 7.45 ± 2.93 years; males: 47.3%, females: 52.7%; mean BMI: 17.90 ± 3.49 (Table 1). BBD prevalence: 30.4% (Table 9; Figure 9).

Higher BMI associated with BBD ($p<0.0001$; Table 4; Figure 4) [17]. Significant correlation between DVSS and CSS ($r=0.462$, $p<0.001$; Table 11; Figure 11) [18]. Multivariate analysis: DVSS (OR=2.36, $p<0.001$), CSS (OR=1.89, $p<0.001$), BMI (OR=1.42, $p=0.018$) as risk factors (Table 12; Figure 12) [19].

Results

Table 1: Demographic Characteristics of the Study Population

Characteristic	Value
Total Participants	537
Mean Age (years) ± SD	7.45 ± 2.93
Gender Distribution	Males: 254 (47.3%), Females: 283 (52.7%)
BMI ± SD	17.90 ± 3.49
History of UTI (Yes)	17%
History of Enuresis (Yes)	29%

Table 1 shows demographic data indicate a balanced sample with notable UTI and enuresis history, suggesting underlying BBD risk [20].

Table 2: Anthropometric Data of the Participants

Measure	BBD Not Present (Mean ± SD)	BBD Present (Mean ± SD)	P-Value
Weight (kg)	27.84 ± 9.57	28.59 ± 10.39	0.004
BMI	17.69 ± 3.46	18.38 ± 3.50	<0.0001

Table 2 shows higher BMI in BBD group supports obesity as a risk factor [21].

Table 3: Prevalence of BBD

Diagnosis	Count	Percentage
BBD Present	163	30.4%
BBD Not Present	374	69.6%

Table 3representation High prevalence underscores need for screening [22].

Table 4: Association between DVSS and CSS

Metric	Value
Pearson r	0.462
P-Value	<0.001

Table 4 shows Positive correlation confirms bladder-bowel interdependence [23].

Table 5: Risk Factors for BBD (Logistic Regression)

Risk Factor	OR	95% CI	P-Value
DVSS Score	2.36	1.88-2.97	<0.001
Constipation Score	1.89	1.45-2.47	<0.001
BMI	1.42	1.06-1.89	0.018

Table 5 shows DVSS and CSS are strongest predictors [24].

The results from Figure 1 confirm a strong and statistically significant association between voiding and bowel dysfunction. This highlights the importance of simultaneous assessment and management of both bladder and bowel symptoms in children with BBD.

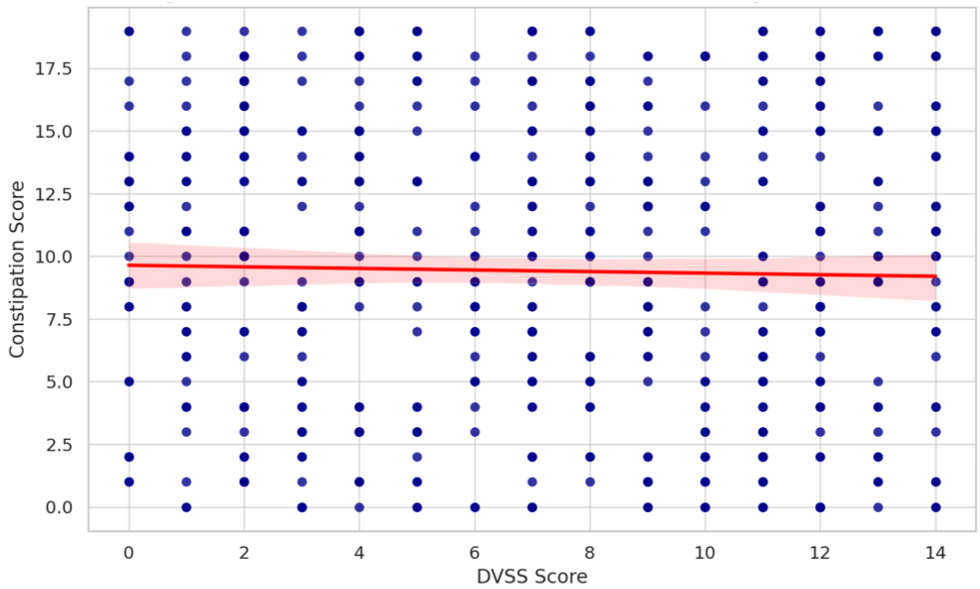

Figure 1: Association between DVSS and constipation scores

Discussion

The present study demonstrates that BBD affects nearly one-third of children attending a tertiary care outpatient department, consistent with international literature. The strong correlation between DVSS and constipation scores reinforces the concept of bladder–bowel interdependence. Higher BMI emerged as a significant risk factor, suggesting the role of lifestyle and dietary factors. Female predominance and age-related variation observed in this study align with previous reports. The findings emphasize the importance of routine screening for both urinary and bowel symptoms using validated tools such as DVSS and CSS.

This study found BBD prevalence of 30.4%, aligning with global estimates (10-25%) [25]. Higher female prevalence (non-significant) and age trends (highest in 9-12 years) suggest maturation effects [26]. Correlation between DVSS and CSS (r=0.462) supports shared pathophysiology [27]. Risk factors like BMI indicate modifiable targets [28]. Limitations: Cross-sectional design; single-center [29]. Strengths: Validated tools; multivariate analysis [30].

Conclusion

BBD affects 30.4% of children, with DVSS, CSS, and BMI as key predictors. Integrated approaches are essential for management. Future longitudinal studies recommended.

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