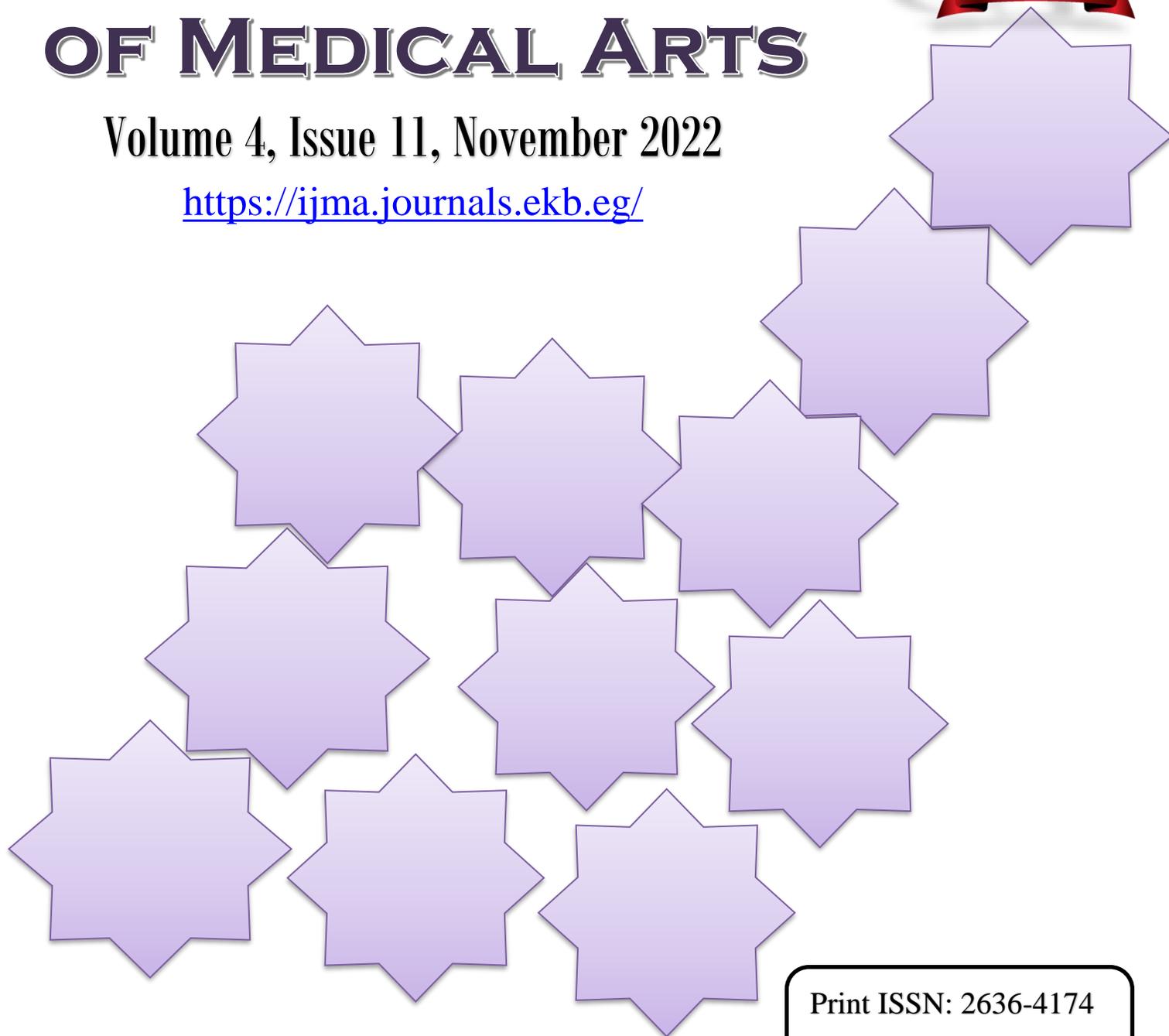


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## Original Article

# A Prospective Study of Behavioral Management of Functional Non-Anatomical Voiding Disorders in Children

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## ABSTRACT

### Article information

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**Background:** Behavioral adjustment, anticholinergic medication, and treating underlying problems such as constipation and UTIs improve voiding dysfunction. Urotherapy, or behavioural management, encompasses all non-pharmacological and non-surgical therapeutic methods. Behavioral management, information and demystification regarding typical lower urinary tract [LUT] function and how one child urinates. Solution instructions, recording symptoms and voiding patterns in bladder diaries, encouragement from caregiver, follow-up are components of urotherapy.

**Aim of the work:** To evaluate the efficacy of behavioral modification alone in management of functional non-anatomical voiding dysfunction in children.

**Patients and methods:** This interventional prospective clinical study was carried out on 104 children with functional non-anatomical voiding dysfunction and/or urinary incontinence, referred to urology clinic and treated only with urotherapy.

**Results:** Out of 104 studied children, 78 [73.6%] of them reported wetness every day before treatment. Most children [96.2%] had urination less than 4 times per day. The most frequent problem found in studied children was rushing to toilet and squatting or crossing legs in all children [100%] followed by not wanting to use school toilet in 36 [34.6%]. After treatment for one month, none of the children complained from rushing to toilet, squatting or crossing legs, not wanting to use school toilet, excessive dribbling, needing to pass urine more than once/2-3 hours and difficult starting urine.

**Conclusion:** The current study showed that behavioral management alone was safe and effective in the management of functional non-anatomical voiding disorders in children.

**Keywords:** Urotherapy; Wetness; Constipation



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## INTRODUCTION

Voiding dysfunction and urinary incontinence in children are common <sup>[1]</sup>. Both have considerable negative effects on quality of life and are linked to comorbid conditions such as constipation and urinary tract infections [UTIs] <sup>[2]</sup>. Incidence of pediatric voiding dysfunction and daytime wetness vary from 1% to 10%. In 6 to 7-year-old children, the incidence is between 2% to 4%, with a rapid decrease in subsequent years <sup>[3]</sup>.

A multimodal strategy is used to treat voiding dysfunction, including behavioral change, anticholinergic medication, and the treatment of underlying problems such as constipation and UTIs. Behavioral management, mostly referred to as urotherapy, is a term which covers all non-pharmacological and non-surgical treatment modalities <sup>[4]</sup>.

Urotherapy includes bladder diaries or frequency-volume charts to document symptoms and voiding habits, and follow-up visits from the caregiver on a regular basis to offer support and encouragement. Constipation and recurring UTIs should also be treated while receiving urotherapy. In case of combined Bladder Bowel Dysfunction [BBD] it is advised to treat the bowel dysfunction first as Lower Urinary Tract Symptoms [LUTS] may disappear after successful management of bowel dysfunction <sup>[5]</sup>.

Although many therapy techniques have had positive effects, the level of evidence is still low because there aren't many randomized control trials [RCTs] available <sup>[6]</sup>.

This interventional prospective clinical study was designed to evaluate the efficacy of behavioral modification alone in management of functional non-anatomical voiding dysfunction in children.

## PATIENTS AND METHODS

The children attended Al-Hussein University Hospital urology clinic at the period of study [March 1st 2022 to July 30 2022] meeting inclusion criteria were included in our study. A dysfunctional voiding scoring system questionnaire was completed for all patients at the beginning of the study, and at 1,2 and 3 months of therapy.

Children [age from 5 to 15 years old] with functional Voiding dysfunction and/or urinary incontinence were included in our study.

Children with persistent unresolved UTI, anatomical voiding dysfunction e.g. Posterior urethral valve, neurological voiding dysfunction e.g. neurogenic bladder and mono symptomatic nocturnal enuresis were excluded.

## Methods

A full history from the kid or his cares was obtained, regarding bowel habits, medical history, and voiding history [including bladder diaries and structured questionnaires [Appendix, included in supplementary file] <sup>[7]</sup>.

Physical assessment includes examination of the back to check for substantial scoliosis, kyphosis, and asymmetry of the buttocks, legs, or feet, as well as other manifestations of neuro-spinal dysraphism in the lumbosacral region [subcutaneous lipoma, skin discoloration, hair growth]. Perineal sensation and lumbosacral reflexes are evaluated during a neurological examination [standing on toes, anal reflex, and tone and bulbocavernosus reflex]. To detect abdominal tumors, a dilated bladder, or a colon loaded with stool, a local examination and abdominal examination were carried out. To determine the location and size of the urethral meatus, the genitalia were inspected. Labial adhesion in females was ruled out. Laboratory investigations included urine analysis, urine culture and sensitivity and serum creatinine level.

Imaging investigations includes pelvi-abdominal ultrasound, uroflowmetry if needed, ascending cystourethrogram if needed and a kidney Ureter/Bladder [KUB] plain film if needed.

Study protocol includes instructions of the children or cares to limit their intake of caffeine, chocolate, and citrus fruits, as well as to make sure they get enough fluids throughout the day. Attention should also be paid to the posture used during micturition and defecation. The alignment of the pelvic muscle relaxation and the bladder contraction should be carefully monitored by resting of both feet on a flat surface <sup>[8]</sup>.

Standardization of fluid intake, the child was instructed for good hydration at the day and

lessen the fluid intake at night. Timed relaxed voiding regimen of every two to three hours, Bowel management and basic relaxed voiding education. The child and family were educated about normal bladder function and responses to urgency. Follow-up of voiding symptoms was done by dysfunctional voiding scoring system questionnaire after 1, 2 and 3 months.

**Statistical analysis:** Microsoft Excel 2016 and the SPSS program [Statistical Package for Social Sciences] version 26.0 were used to tabulate and statistically analyses the obtained data. For numerical parametric data, descriptive statistics were performed using the mean, SD [standard deviation], minimum and maximum of the range; for numerical non-parametric data, they were performed using the median and first and third interquartile ranges; and for categorical data, they were performed using the number and percentage. When there were two independent groups and parametric data for quantitative variables, inferential analyses were carried out using the independent t-test, and when there were two independent groups and non-parametric data, the Mann Whitney U.

## RESULTS

Four hundred and fifty children attended Al-Hussein University Hospital urology clinic suffering from voiding disorders and or urinary incontinence at the period of study, one hundred and eighteen of them were out of age of the study, 104 were complaining of mono-symptomatic nocturnal enuresis, fifty six cases were excluded due to neurological and anatomical causes, sixteen children missed follow up during the study, so the study was done for one hundred and four children .

This prospective clinical study was carried out on 104 children with functional non-anatomical voiding dysfunction and/or urinary incontinence. Sixteen children complained of UTI and treated before starting our study. The age of studied children ranged between 5 years and 15 years with mean  $\pm$  SD was  $9.06 \pm 3.02$  years. It was noticed that nearly half children were males [51.9%] while there was 50 [48.1%] females with male to female ratio was 1.08:1 [table 1].

Out of 104 studied children, 76 [73.9%] of them reported wetness every day before treatment while 28 [26.1%] had wetness twice or more per week.

The most frequent problem found in studied children was rushing to toilet and squatting or crossing legs in all [100%] children followed by not wanting to use school toilet in 36 [34.6%] children then excessive dripping in 26 [25%] children. The least frequent problem needed to pass urine more than once/2-3 hours and difficult starting urine that found in 2 children as shown in table [2].

It was observed that none of studied children showed any abnormalities when investigated by pelviabdominal U/S urine analysis as 16 of them were treated from UTI before starting our study.

After two months, 26 [25%] of children reported wetness twice or more/week, 72 [69.2%] had wetness once per month while 6 [5.8%] had wetness twice or more per month.

After three months, eighty-four [80.8%] had wetness once per month while twenty [19.2%] had wetness twice or more per month as shown in table [3].

After 3-months treatment follow up period, none of patients complained from rushing to toilet, squatting or crossing legs, not wanting to use school toilet, excessive dripping, needing to pass urine more than once/2-3 hours and difficult starting urine. After 3 months treatment follow up period, none of patients had urinary tract infection at time of our study. Psychological factors were noticed in six [5.8%] children and those children were dry before exposure to psychological factor. eighty-six children were dry at the last week. None of them was complaining of constipation as shown in table [4].

After one month of treatment, 86 [82.7%] of them reported wetness twice or more/week while 18 [17.3%] had wetness twice or more per month. And all children [100%] had urination for 4-8 times. At two months follow up, it was found that 26 [25%] of children reported wetness twice or more/week, 72 [69.2%] had wetness once per month while 6 [5.8%] had wetness twice or more per month. All children [100%] had urination for 4-8 times.

After three months, 84 [80.8%] had wetness once per month while 20 [19.2%] had wetness twice or more per month. All children [100%] had urination for 4-8 times.

**Table [1]:** Demographic data of the children

Description		Studied children [n= 104]	
		No.	%
<b>Gender</b>	Male	54	51.9%
	Female	50	48.1%
<b>Age [years]</b>	Mean $\pm$ SD [Range]	9.06 $\pm$ 3.02 [5.0 – 15.0]	
	Median	8.5	
<b>Weight [Kg]</b>	Mean $\pm$ SD [Range]	27.15 $\pm$ 8.23 [17.0 – 50.0]	
	Median	25.0	
<b>Working mother</b>	No	82	78.8%
	Yes	22	21.2%
<b>Who lives in the household</b>	Father	2	1.9%
	Mother	0	0.0%
	Both	100	96.2%
	None	2	1.9%

**Table [2]:** Problems faced children in pretreatment period

Description		Studied children [n= 104]	
		No.	%
<b>Need to pass urine more than once/2-3 hours</b>	No	102	98.1%
	Yes	2	1.9%
<b>Difficult starting urine</b>	No	102	98.1%
	Yes	2	1.9%
<b>Hurting</b>	No	68	82.7%
	Yes	18	17.3%
<b>Scared of toilets</b>	No	82	78.8%
	Yes	22	21.2%
<b>Not wanting to use school toilet</b>	No	68	65.4%
	Yes	36	34.6%
<b>Rushing to toilet</b>	No	0	0.0%
	Yes	104	100.0%
<b>Squatting or crossing legs</b>	No	0	0.0%
	Yes	104	100.0%
<b>Excessive dribbling</b>	No	78	75.0%
	Yes	26	25.0%
<b>History of UTI</b>	No	88	84.6%
	Yes	16	15.4%
<b>Attacks of UTI</b>	No	88	84.6%
	One	4	3.8%
	Two	12	11.5%
<b>Psychological factor</b>	No	98	94.2%
	Yes	6	5.8%
<b>Dry before Psychological history</b>	No	98	94.2%
	Yes	6	5.8%
<b>Wetness at the last week</b>	No	0	0.0%
	Yes	104	100.0%
<b>Constipation</b>	No	58	55.8%
	Yes	46	44.2%
<b>Expected date of dryness</b>	Mean $\pm$ SD [Range]	3.0 $\pm$ 0.17 [2.5- 4.0]	
	Median	3.0	

**Table [3]:** Wetness "at day last 1 month" after 3-months treatment follow up period

Description		Studied children [n= 104]	
		No.	%
<b>Wetness frequency at last 1 month</b>	Every day	0	0.0%
	Twice or more/week	0	0.0%
	Once /month	84	80.8%
	Twice or more/month	20	19.2%
	Once in last 3 months	0	0.0%
	Twice or more in last 3 months	0	0.0%

**Table [4]:** Clinical evaluation after 3-months treatment follow up period

Description		Studied children [n= 104]	
		No.	%
<b>History of UTI</b>	No	104	100.0%
	Yes	0	0.0%
<b>Psychological factor</b>	No	98	94.2%
	Yes	6	5.8%
<b>Dry before Psychological history</b>	No	98	94.2%
	Yes	6	5.8%
<b>Wetness at the last week</b>	No	86	82.7%
	Yes	18	17.3%
<b>Constipation</b>	No	104	100.0%
	Yes	0	0.0%

## DISCUSSION

The main aim of this study was to evaluate the efficacy of behavioral modification alone in management of functional non-anatomical voiding dysfunction in children.

This interventional prospective clinical study was carried out on 104 children with functional non-anatomical voiding dysfunction and/or urinary incontinence, referred to urology clinic.

Regarding socio demographic data, the age of studied children ranged between 5 years and 15 years with mean [ $\pm$  SD] was  $9.06 \pm 3.02$  years. It was noticed that nearly half children were males 54 [51.9%] while there were 50 [48.1%] females with male to female ratio was 1.08:1. The mean weight of children was  $27.15 \pm 8.23$  Kg. Only 21.2% of those children had working mothers and most of them [96.2%] were living with both their father and mothers.

In agreement with our study **Mulders et al.** [8] assessed the effectiveness of urotherapy in children with lower urinary tract dysfunction on 90 children, they found that the mean age was  $8.8 \pm 2.0$  years with 49 [40.2%] boys. However, the study by **Mulders et al.** [8] revealed that daytime urinary incontinence was in 98 children [80%] a predominant symptom. Of these 98 children, 72 [75%] also had nocturnal enuresis. Of the remaining 24 children, 14 had nocturnal enuresis only and 10 children were continent.

The most frequent problem found in studied children was rushing to toilet and squatting or crossing legs in all [100%] children followed by not wanting to use school toilet in 36 [34.6%] children then excessive dribbling in 26 [25%] children. The least frequent problem needed to pass urine more than once/2-3 hours and difficult starting urine that found in 2 children.

**Shafik et al.** [9] revealed that daytime incontinence is associated with various comorbid conditions such as urinary tract infection, vesicoureteral reflux, constipation, and behavioral troubles. The characteristics of Non-neurogenic voiding dysfunction [NVD] are lower urinary tract symptoms [LUTs] and urinary tract infections [UTI].

Our results indicated that urotherapy resulted in considerable reduction in terms of urinary tract infection.

In agreement with our results **Chase et al.** [10] reported that in individuals with VUR, urotherapy lessens the need for surgery while easing constipation and the incidence of urinary tract infections.

Also, **Altunkol et al.** [11] revealed that after standard urotherapy, there was reduction in urinary tract infection incidence to a percentage of 37.5%, incontinence to a percentage of 37.9% and the PVR volumes to a percentage of 19.1%.

Our results indicated that urotherapy resulted in considerable improvement in terms of wetness and urination frequency.

In agreement with our results, **Altunkol et al.** [11] revealed that after standard urotherapy it was found that incontinence rates were significantly decreased, furthermore, the study revealed that after the standard urotherapy plus biofeedback sessions, the post-void residual urine volumes, incontinence rates and infection rates of patients were significantly lower than those with the standard urotherapy [ $p < 0.05$ ].

Also, **Mulders et al.** [8] revealed that urotherapy showed a significant reduction in daily voiding frequency [mean  $7.0 \pm 1.3$ ,  $P < 0.001$ ]. The study concluded that urotherapy is

successful for the treatment of daytime urinary incontinence in children. Additional benefit was evident in improvement of accompanying voiding symptoms.

Furthermore, **Ladi-Seyedian et al.** [12] revealed that the mean number of voiding episodes was significantly increased after biofeedback therapy compared with only standard urotherapy [ $6.6 \pm 1.6$  vs.  $4.5 \pm 1$  times a day;  $P < 0.001$ ]. Urinary tract infection did not relapse in 9 of 11 [81%] and 8 of 15 [38%] patients in both groups [ $P 0.02$ ].

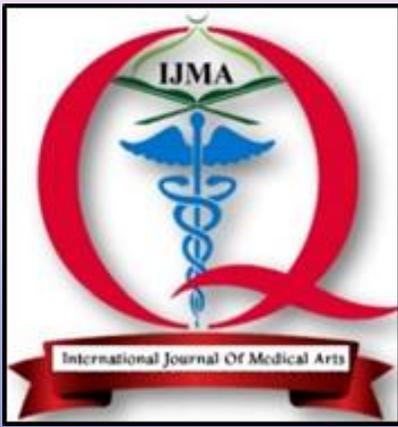
Regarding complications, at all follow-up time points, none of patients complained from rushing to toilet, squatting or crossing legs, not wanting to use school toilet, excessive dripping, needing to pass urine more. Also, it was observed that none of studied children showed any abnormalities when investigated by pelviabdominal U/S urine analysis. No studies in literature, reported any adverse events associated with urotherapy treatment.

**Conclusion:** The current study showed that behavioral modification alone was safe and effective in the management of functional non-anatomical voiding dysfunction in children.

**Conflict of Interest and Financial Disclosure:** None

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