EFFECT OF NOVENARY ASANAS: A METHOD TO AMELIORATE PELVIC STRENGTH AND REDUCE THE FREQUENCY OF BEDWETTING.

[1]Dr. VIDHI SHAH, [2]Dr. TUSHAR J. PALEKAR, [3]AKANKSHA MITTAL, [4]BHARGAVI SUKEY, [5]ANUJ LAHOTI, [6]Dr. Dhiraj Kumar Arun Mane

1. Ph.D Scholar, Associate Professor, DR. D.Y.PATIL COLLEGE OF PHYSIOTHERAPY- PIMPRI, PUNE
2. PRINCIPAL, DR. D.Y.PATIL COLLEGE OF PHYSIOTHERAPY- PIMPRI, PUNE - PIMPRI, PUNE
3. RESIDENT , DR. D.Y.PATIL COLLEGE OF PHYSIOTHERAPY- PIMPRI, PUNE - PIMPRI, PUNE
4. RESIDENT AT DR. D.Y.PATIL COLLEGE OF PHYSIOTHERAPY- PIMPRI, PUNE - PIMPRI, PUNE
5. RESIDENT AT DR. D.Y.PATIL COLLEGE OF PHYSIOTHERAPY- PIMPRI, PUNE - PIMPRI, PUNE
6. Statistician, Directorate of Research, Krishna Vishwa Vidyapeeth, Karad.

Received: 11 November 2024|**Revised:** 4 February 2025|**Accepted:** 1 march 2025

Abstract:

Introduction: Primary Nocturnal Enuresis (PNE) also known as bedwetting is defined as involuntary loss of urine which occurs at night by children old enough who are expected to have bladder control. The aim of the current research was to assess the impact of Novenary asanas to improve pelvic floor muscles strength and voiding function in children experiencing bed wetting issues.

Methods: A Randomized control trial was conducted in Pune, Maharashtra. A sample size of 30 was arrived by using the prevalence of nocturnal enuresis. The Institutional approval (DYPCPT/ISEC/50/2022) was taken from Dr. D.Y. Patil Vidhyapeeth, Pune. The study includes thirty children with PNE, 20 boys and 10 girls, range 5 -11 years of age in accordance with the inclusion requirement. Children were divided into two random groups, the yoga group and the conventional group. Twenty sessions with a run time of 30 minutes were held for five days a week. Clinical parameters such as sEMG, DVSS, Bladder diary were recorded prior to and following treatment sessions.

Results: Data was normally distributed for group A(Yoga) and B(Conventional), t-Test was applied. The data was significant within the group A & B for DVSS and sEMG. But, for intergroup the results were not significant for both the parameters. The third component, Bladder diary, showed decreased frequency of nighttime bedwetting in both the groups after 4 weeks.

Conclusions: Preliminary findings from our investigation show that both Novenary asanas and pelvic floor exercises have significant effects on pelvic muscle strength, child's voiding function and frequency of bedwetting.

Key words: ***Bedwetting, nocturnal enuresis, novenary asanas, pelvic muscle strength***

INTRODUCTION: Primary Nocturnal Enuresis (PNE), also known as bedwetting is defined as involuntary loss of urine which occurs at night by children old enough who are expected to have bladder control. Child is labelled enuretic only when there is a history of bedwetting (more than twice a week) beyond the age of 5 years1.

Prevalence of nocturnal enuresis has been found more in male children than in female children. It has been recorded that prevalence of nocturnal enuresis in India is 7.61% to 16.3%. In Maharashtra the prevalence was found to be 11.4%. Studies have shown that prevalence is higher in children aging 5-8 years (6-8years) and lowest in children aging 11-12 years (8-10 years). It has been found that children with nocturnal enuresis have lower self- esteem, mental health, and skills, as well as a negative relationship with their parents and others. Children with PNE have reduced self-esteem scores than children with secondary nocturnal enuresis2.

Causes of Nocturnal enuresis are Bladder function, Detrusor instability, Genetic factors, Maturation delay, Hormonal factors, psychological factors and sleep disorders3. Many studies have evaluated Nocturnal enuresis by History taking, Physical examination, Urinalysis, Urine culture, Blood count, Serum chemistry, Imaging studies, Urodynamic studies3.

Multiple approaches have contributed towards treatment of Primary nocturnal enuresis and states that it begins with educating the child and parents about the condition; before addressing primary nocturnal enuresis, daytime symptoms should be actively identified and managed; and, if identified, secondary causes should be treated appropriately. Non-Pharmacological options used for treating enuresis consist of Motivational Therapy (includes rewarding systems), Encouraging fluid intake before bedtime (to improve bladder capacity), Bladder Training, Alarm Therapy, Dry-Bed training, Biofeedback, Full spectrum home training. Pharmacological optionincludes Oral Desmopressin, Oral Imipramine, Oral Oxybutynin, Combined pharmacotherapy includes Desmopressin and Oxybutynin (showed rapid results compared to individual drugs)2,3.

The pelvic floor is muscular partition that separates pelvic cavity from anatomical perineum. It has three layers comprising of:

First Layer (Endopelvic fascia)-It is a lining made of a mesh of smooth muscle fibers, ligaments, nerves, blood vessels, and connective tissue. It supports the bladder and inner organs.

Second Layer (Pelvic Diaphragm)-The levator ani also known as “the lifter of the anus” is the most important muscle of the pelvic floor. Levator ani not only provides organ support but also guarantees continence at night. Muscle has approximately 70% slow muscle fibers and 30% fast muscle fibers. It consists of pubococcygeus muscle, puborectalis muscle, pubovaginalis muscle (in women only), levator prostate muscle (in men only), iliococcygeus muscle, coccygeus muscle and internal sphincter muscles.

Third Layer (Urogenital Diaphragm)-Consist of Deep transverse perineal muscle which assists with continence, superficial transverse perineal muscle, bulbocavernous muscle (musculus bulbospongiosus), ischiocavernous muscle, and the anal sphincter4.

The pelvic muscles play an important role for all over function of the body. Its function is mainly to provide organ support, closure of the urethra and anorectum which is based on muscle tone and contractions within subconscious control and opening of the sphincters voluntarily. For example, micturition, making stool, and sexual function. The Pelvic floor is essential for postponement of micturition during urgency and full bladder sensation, which is voluntarily controlled by the sphincter5.

Various parameters are available for evaluation of enuresis and pelvic floor muscles which are physical examination, urinalysis, urine culture, blood count, urodynamic studies, ultrasonography, digital palpation, manometry, electromyography (EMG)3,7.

EMG is a diagnostic procedure used in the evaluation of muscular function. It is widely used under conditions affecting the central nervous system and the peripheral nervous system. It gives visual feedback in the form of graphs. EMG can be used for pelvic floor muscle evaluation in children with enuresis using a wide range of electrodes such as endoanal probes, vaginal probes, and button electrodes. Surface EMG becomes a noninvasive electrodiagnostic method by using button electrode. Perianal muscles participate in assessment of pelvic floor muscle surface EMG. Various positions are used for the assessment like supine, sitting and standing. Each maneuver helps the muscles for its recruitment. Perianal muscles are easily accessible with surface button electrode and is useful for children. It can be utilized as a diagnostic tool as well as intervention. Bladder function of perianal muscles can be assessed by using surface EMG in children with enuresis8.

The DVSS is a grading instrument for diagnosing dysfunctional voiding that is both accurate and simple to use. It has capacity to assign a numerical score to the severity of dysfunctional voiding symptoms could aid in rational decision-making, direct treatment and investigation, and stratify treatment intensity toward patients who require the most follow-up9.

The bladder diary is a tool for recording voiding parameters such as fluid intake, frequency of voiding, and the number of incontinent episodes during the night. The bladder diary helps the child focus on the issue and provides concrete data that can be used in subsequent treatment. When it becomes clear that inattentive voiding is a contributing factor to the incontinence, the bladder diary can also be utilized as part of a program of positive reinforcement10.

Various strategies are used for the treatment of enuresis which are behavioural interventions, motivational therapy, bladder training, dry-bed training, bed alarm therapy, full spectrum therapy, biofeedback, pelvic floor exercises, yoga3,4,7,11,12,13.

Yoga is one of six schools of Indian philosophy, as well as a component of Ayurveda, an Indian traditional medical system14. It frequently refers to the union of the spirit, body, and mind. Yoga strengthens the connection between the

mind and body and gives physiological shape to emotions, thoughts, and attitudes.Yoga is a new method and can be implemented for both stress and muscle weakness13. Yoga is a promising therapy for children. Certain yoga postures or asanas have been shown to help children overcome bed wetting. It will improve control and coordination by stimulating the nervous system and influencing the spinal cord's micturition system. Yoga has been shown to improve bladder control in people with urinary incontinence. It has been claimed that the yoga program improves pelvic health and aids in gaining control of urine leakage. Additionally, yoga helP to focus the mind, relax more, relieves stress and anxiety, lessens and prevents psychosomatic and stress related disorders15.

Thus, the study aimed to evaluate the effectiveness of Yoga versus conventional therapy on children suffering from Primary Nocturnal Enuresis.

METHODS

For the present Randomized controlled trial study, we enrolled 30 children who were selected according to inclusion criteria found from different areas such as hospitals, residences, slum areas suffering from Primary Nocturnal Enuresis (PNE). The institutional Ethical approval was taken from Dr. D Y Patil Vidyapeeth, Pimpri Pune (DYPCPT/ISEC/50/2022). History of bedwetting frequency was gathered from the parents and parents were convinced to come for examination in Dr DY Patil college of physiotherapy. The purpose of the study was explained to the parents and written informed consent was taken from them. The treatment protocol and the duration were explained to the parents. The sample size was calculated using Medcalc 18.2.1 and were further randomly allocated in the two groups by Coin method.

Boys and girls both between the age group of 5-11years, diagnosed cases of Primary Nocturnal Enuresis on basis of history of bedwetting at least twice a week and willingness to participate in the study were selected. Those who had medical co-morbidities with the history of previous neurosurgical procedures, neurological malformations or brain neoplasia, Functional limitations due to musculoskeletal injuries like fracture, subluxations, dislocations, sprains and strains in both upper and lower extremities and patients with any neurological, psychological and epileptic disorders were excluded in the study. Children were randomly allocated into two groups. Group A (n=15) children received Yoga and Group B (n=15) children received conventional therapy. The subjects were assessed before the treatment procedure and at the end of 4 weeks by Dysfunctional voiding Score system (DVSS), Surface EMG of Pelvic Floor muscles, and Bladder diary. The duration of the treatment was 5 days a week for the period of 4 weeks; which was 20 sessions in 4 weeks. Participants of group A performed the following set of Novenary asanas which were as follows.

1. Warm up exercises which include Suryanamaskar (10 minutes)

2. Yoga Asanas

Novenary asanas such as Baddhakonasana, Malasana, ArdhaMatsyendrasana, Gomukhasana, Utkasana, Trikonasana, Setubandasana, and relaxation asanas which included Savasana, Nishpanda Bhava were performed by the children. Each asana position was held for 10-15 seconds and further progressed to 20-30 seconds hold.

Group B participants were allocated to the conventional group which underwent pelvic floor exercises.
1. Warm up exercises such as Movements of all joints, spotmarching.

2. Pelvic floor exercises (5-7 reps progressing to 10 reps) which includes, Pillow squeeze, Isometric contraction of gluteus, Pelvic bridging, Spinal twist, and Pelvic tilt exercise.

Surface EMG was taken in children with enuresis. It was taken at the start of the session and at end of the duration of four weeks of treatment. Parent or guardians were explained about the procedure and with proper consent the procedure was preceded.

Patient Position: -The child was lying down straight in supine lying with both the knees bent (crook lying). Parent or guardian was asked to stay in the room while the surface EMG was performed. Patient Preparation: -The child's perianal region was exposed and was cleaned with spirit. The electrodes were also cleaned before application.
Placement of electrodes: The machine was tested prior to the application on the patient. Both the electrodes, that is cathode and anode were placed around perianal region and ground electrode was placed at posterior aspect of the thigh to complete the circuit. Recording of the surface EMG readings: - Three readings were taken as follows.

- No contraction (Spontaneous activity- SPA): During SPA reading child was instructed to stay relax and the reading was recorded at rest.

- Maximum Voluntary Contraction (MVA): During MVA reading child was instructed to contract his/her perineum for 10 seconds.
- Maximal Voluntary Contraction (QMUP): Child was instructed to contract his/her perineum maximally for 10 seconds.

DVSS score and Bladder diary were recorded prior to and following the treatment sessions. Data analysis: The data were analyzed using MEDCALC Software. The data was normally distributed for Group A(Yoga) and Group B (Conventional), and t test was applied.

BADDHAKONASANA

MALASANA

ARDHAMATSYENDRASANA

GOMUKHASANA

UTKASANA

TRIKONASANA

SETUBANDASANA

STEP3:-Relaxation Yoga

SAVASANA

NISHPANDABHAVA

RESULTS

Table 1: Baseline characteristics of patients (n = 30)

Variables	Group A	Group B
Age	6.8 ± 2.3	7.2 ± 1.8
Gender	Boys - 9	Boys - 11
	Girls - 6	Girls - 4

Table 2: Intra group comparison of mean of DVSS score and MVA

Variables	Group	Pre comparison (Mean ±SD)	Post comparison (Mean ±SD)	T/Z value	p- value
DVSS SCORE	Group A	11.7 ± 1.8	4.8 ± 1.4	Z =16.19	<0.0001
	Group B	12 ± 1.9	4.6 ± 1.3	Z =15.13	<0.0001
MVA	Group A	335.3 ± 103.4	427.0 +107.2	T =7.76	<0.0001
	Group B	333.5 ± 115.0	436.9 ± 131.8	T = 6.12	<0.0001

DVSS score was compared using wilcoxon test based on normality whereas MVA was compared using paired t test.

Table 3: Inter group comparison of mean difference of DVSS score and MVA

Variables	Group A (Mean ± SD)	Group B (Mean ±SD)	t value	p- value
DVSS SCORE	6.8 ± 1.6	7.3 ± 1.8	0.72	= 0.47
MVA	427 ± 107.2	436.9 ± 131.8	0.22	=0.8226

Intergroup comparison of DVSS score and MVA was done using paired t test.

DISCUSSION

Weakness of pelvic floor muscles is one of the causes for enuresis [8]. The pelvic floor is a intricate anatomical structure with specialized biomechanical capabilities as well as neuromuscular and fascial components. Core stability, continence, voiding, defecation, sexual function, and delivery all depend on the Pelvic Floor.

Bed wetting is an embarrassing scenario for both children and parents, but it is not a serious condition and is prevalent in boys. Yoga plays a significant influence in the prevention of bedwetting. These exercises will help to improve bladder control and reduce incidence of bed wetting. Strengthening urination-controlling muscles with yoga is beneficial.

A study was conducted in 2018 which concluded that, yoga can help reduce the frequency of bedwetting. Thus, the study's findings suggest that yoga is quite effective in helping kids stop wetting the bed in addition to giving them psychological and moral boosts. Thus, the result obtained from this study is relevant to the result obtained in current study [13].

Study conducted by I.BUT a, Marcun Varda to evaluate potential clinical and urodynamic effects of functional magnetic stimulation compared to placebo in the treatment of girls with primary nocturnal enuresis (PNE). Twenty girls were taken out of which 10 were treated with active devices and the remainder with placebo devices which showed that there was no significant differences between the two groups in terms of age, enuretic episodes and urodynamic parameters ($p>0.05$) [16,17].

In present study, we found same results compared to above study as ($p>0.05$) which depicts that there were no significant differences between the two groups in terms of age, enuretic episodes and pelvic muscle strength.

Amacho ST, Kim KH studied pelvic floor muscles exercise and training for coping with urinary incontinence; they researched the use of Pelvic floor muscle exercise in clinical settings as a behavioural therapy for urinary incontinence. They also concluded that while it takes some practise to become proficient in Pelvic floor muscle exercise, most patients succeed with it after receiving consistent instruction [7].

In our study, we also found that pelvic floor training with exercises has shown significant improvement in strength of the muscles.

Kalyanakrishnanramakrishnan, md, has investigated many non-pharmacological methods for Evaluating and treating enuresis, including motivational therapy, bladder training, dry-bed training, enuresis alarm, and biofeedback. He has also demonstrated pharmacological options for treating enuresis [3]. However, in the current study nonpharmacological techniques were used.

A pilot study, Does yoga help in nocturnal enuresis in children conducted by B.Arun 1, S. Rajesh Kannan 2 shows that after structured yoga program given to children there was significant improvement in the urinary control of children and they concluded that yoga plays a vital role in nocturnal enuresis as well as improves moral boost in children [15].

This study supports the present study as New Novenary asanas was first time implemented as treatment of enuresis in children which shows significant difference in muscle strength, voiding function, and reduced frequency in bedwetting episodes. The probable physiology behind this may be the child learns to be serious and concentrate on the condition, which reflects the memory and therefore shows improvement.

A study conducted by Vidhi Shah et al, to assess the activity of perianal muscles in children with enuresis using surface EMG showed that the mean values of amplitudes of surface EMG(QMUP) in normal children and enuretic children were 428.6 ±118.6 µV and 248.01±45.85 µV ($p<0.05$) which shows lowered amplitude in enuretic children compared to normal children. The current study where children diagnosed with Primary Nocturnal Enuresis in age group of 5 to 11 years were categorized into two interventional group where in one group received Novenary asanas and other group received conventional pelvic floor exercises and behavioral therapy. This both treatment has potential significant on pelvic muscle strength as Surface EMG (QMUP) mean values of Group A and B were taken respectively and the intergroup analysis shows that $p=0.6$, which proves that both are equally effective. When other parameter of Surface EMG (MVA) mean values that is 427.0 and 436.9 was taken into consideration results obtained were indicating $p=0.8$ which were found to be effective in both the groups. Both the treatment is effective in voiding function also as the mean difference of yoga and pelvic group DVSS is 6.8 and 7.3 respectively and the intergroup analysis shows that $p=0.4$ so both treatment programs are equally effective. There was intergroup significant difference between two groups so the frequency of voiding was reduced effectively in both the groups. So, DVSS score and bladder diary have revealed that the occurrence of bedwetting has been reduced in both the groups which is found to be first of its kind.

These findings support the inclusion of Novenary Asanas and pelvic floor training in the treatment of Primary Nocturnal Enuresis.

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