Prevalence and characteristics of Nocturnal Enuresis (NE) in affected children aged 5-18 years in Saudi Arabia

Saleh Mohamed Alrajihi [1], Hawra Abdali Alshajarah [2], Reem Ridha Alhijri [3]
Alaa AlQurashi [4], Abdulaziz Ali Subyani [5], Abdulaziz Abdullah Alqarni [6]
Noura Yousef Alrashada [7]

(1) Family Medicine Department, Central Second Health Cluster, Riyadh, Kingdom of Saudi Arabia.
(2) School of Medicine, Xi'an Jiaotong University, Xi'an, China.
(3) College of Medicine, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia.
(4) Epidemiology and Public Health Department, Central Second Health Cluster, Riyadh, Kingdom of Saudi Arabia.
(5) College of Medicine, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia.
(6) College of Medicine, King Saud Bin Abdulaziz University for Health Sciences, King Abdullah International Medical Research Centre, King Abdulaziz Medical City, Ministry of the National Guard-Health Affairs, Jeddah, Kingdom of Saudi Arabia.
(7) College of Medicine, King Faisal University, AlAhsa , Kingdom of Saudi Arabia.

Correspondence:
Ms. Alaa AlQurashi,
Clinical Research Specialist,
Epidemiology and Public Health, Department, Central Second Health Cluster P.O. Box. 59046, Riyadh 11525 Kingdom of Saudi Arabia.
Tel: (+966) 11 288 9999 Ext: 10857.
Email: aaalqurashi@kfmc.med.sa

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Abstract

Background: Nocturnal enuresis (NE) is involuntary urination that happens while you're asleep after a certain age when you should be able to control your bladder at night. Depending on when the condition first appears, enuresis is divided into primary and secondary categories. Families shouldn't be concerned about it, but we must be mindful of the effects it may have on the family and the child. This study aims to determine the prevalence and to reveal the characteristics of Nocturnal Enuresis (NE) in affected children aged 5-18 years in Saudi Arabia.

Materials and Methods: A cross-sectional descriptive study was carried out among 458 Saudi parents/caregivers, whose children were aged from 5 to 18 years. It was conducted during the period from July 2022 to November 2022. An electronic questionnaire was designed using a Google form distributed among parents/caregivers in Saudi Arabia. Ethical approval was obtained from KFMC. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 26.

Results: 75% of children suffering from NE were males and 51.9% had an age ≥ 10 years with a mean age of 8.78± 3 years. In this study 34% of the children with NE experienced 2-4 bouts of bedwetting, per week. The most common procedure done for management was Behavioral Stimulation Therapy (75.9%) and 55.6% reported improvement of the child after the intervention. Male children, and those with an age <10 years had a significantly higher percentage of daily NE (p=<0.05). Children who were circumcised and those who drink a lot of water or any other beverage had a significantly higher percentage of having daily NE (p=<0.05). At the same time, children who had UTI had a significantly higher percentage of having daily NE (p=<0.05).

Conclusion: NE occurs among children in various Saudi Arabian regions. Male gender, aged 5 to 10 and suffering from weakness of bladder muscles, chronic constipation, worry and depression was associated with NE and UTI. Families and caregivers utilize effective therapies such as alarm and behavioral stimulation, however, they do not look for medical assistance.

Keywords: Nocturnal Enuresis, Children, Characters, Prevalence

Introduction

Nocturnal enuresis (NE) is the involuntary urination that occurs while asleep after an age when bladder control at night is expected (involuntary urination that happens during the day is known as diurnal enuresis (1).

It is grouped into two types: primary and secondary. Primary nocturnal enuresis occurs when a patient has never achieved continence for at least 6 months, whereas secondary nocturnal enuresis is onset of symptoms after a patient had achieved continence of at least 6 months (2,3). Age, male gender, daytime incontinence, encopresis, social anxiety, delayed walking age, positive parental history of enuresis, and sibling history of enuresis are all risk factors associated with NE (4). Nocturnal enuresis can cause low self-esteem, a sense of failure, chronic stress, and social problems for children. It has been linked to a variety of behavioral, psychological, and social issues. As a result, it is critical to identify at risk children and take therapeutic steps (5).

The universal incidence of Nocturnal enuresis in children 6-12 years of age was shown to be 15%-25% in one study, while a study in Saudi Arabia showed an incidence of 31.2% among children aged 3-12 years (2,6).

Enuresis is a prevalent clinical condition that affects both students and their parents' quality of life as a result of the disorder's impact on social life, and emotional and learning issues arise (7).

Therefore, our aim of the study is to determine the prevalence and to reveal the characteristics of Nocturnal Enuresis (NE) in affected children aged 5-18 years in Saudi Arabia.

Subjects and Methods

Study Design, setting and time frame: a cross-sectional study was done at KFMC from August to November 2022.

Study participants: the inclusion criteria were guardians of children aged 5-18 years' old who are residents in Saudi Arabia. And the exclusion criteria: was any participant with chronic diseases such as (Mental defect, paralysis, diabetes mellitus, sickle cell disease, congenital defect, epilepsy or other neurological defect).

Sample size: by using Raosoft online sampling with margin of error of 5% and confidence level of 95% and according to the most recent study that was conducted in Saudi Arabia measuring the prevalence of NE among children, our estimated sample size is 330

Study instrument: an electronic pre-designed questionnaire in a Google form was distributed among parents in Saudi Arabia through social media platforms (What's App) and through the community, in public places to target the General population. A brief introduction and the aim of the study was written and consent was obtained from the parents. Questions were adapted from a previous literature review (8). Two expert reviewers edited the questionnaire and modification was done based on feedback from reviewers. The last version of the questionnaire contained three sections. The first section included items to collect the children's demographic characteristics and the 2nd section had multiple questions regarding sleep pattern and involuntary urination types. The 3rd section was about the consequent effects on the family with 4 response options.

Data collection:
An electronic questionnaire designed using Google form was distributed among parents/caregivers in Saudi Arabia. It was distributed through social media platforms (What's App groups, emails) and through the community in public places to target the General population. A brief introduction and the aim of the study was written and consent was obtained from the parents/caregivers. Questions were adapted from previous literature review [8]. Two expert reviewers edited the questionnaire, and modification was done based on feedback from reviewers. The final version of the questionnaire contained three sections. The first section gathered demographic data of the child and the parent/caregivers. The second section had multiple questions regarding sleep pattern and involuntary urination types. The third section enquired about the scale of consequential effects on the family with 4 response options (large degree, medium degree, small degree, not at all). To enhance validity and clarity of the questionnaire the final form was piloted on 10% of the sample.

Ethical consideration:
Ethical approval was obtained from KFMC. The link only opened if participants selected 'agree to participate'. The questionnaire had a brief introduction explaining its aim and purpose and informing participants that participation is entirely voluntary. No names were recorded in the surveys, neither date of birth nor address was collected. All answers were kept confidential and safe.

Statistical analysis:
Data analysis: data was analyzed using SPSS version 26. To investigate the association between the variables, the Chi-squared test ($\chi 2$) was applied to qualitative data that was expressed as numbers and percentages. Quantitative data was expressed as mean and standard deviation (Mean ± SD) and a p-value of < 0.05 was considered significant.

Results

(Figure 1) illustrates that of the studied guardians, 108 (76.8%) reported that they have a child or children who suffer from nocturnal enuresis (NE).

Figure 1. Percentage distribution of guardian according to having a child or children suffering Nocturnal Enuresis (NE) (No.: 465)

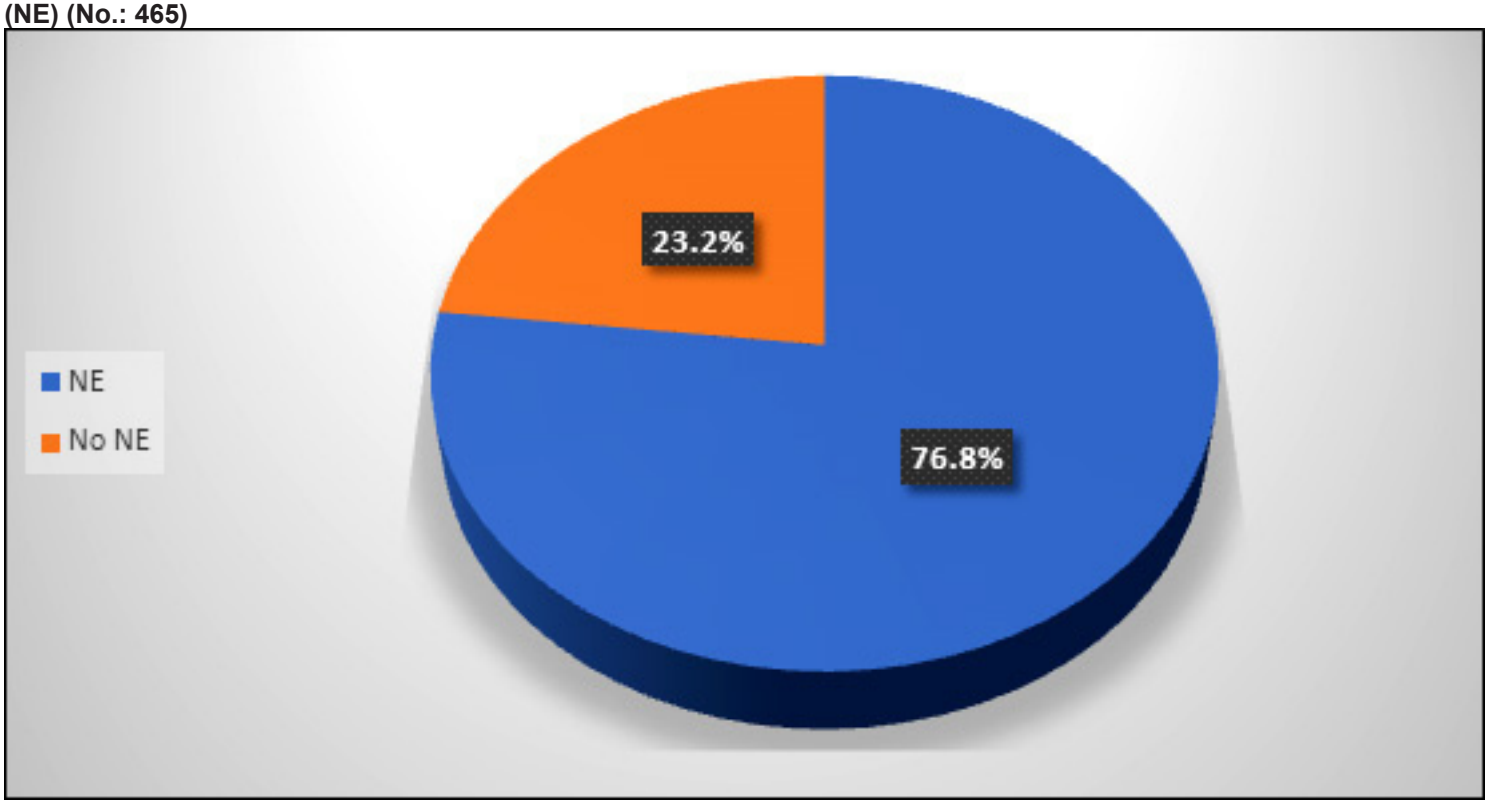


Table 1 shows that 75% of children suffering from NE were males and 51.9% had an age ≥ 10 years with a mean age of 8.78± 3 years. Of them, 90.8% were of Saudi nationality, 44.6% were from the Central region of KSA, 45.5% had a monthly family income <10000 SR and the mean number of family members with father and mother was 6.69 ± 6.37. Most children (90.9%) were living with their parents, and the mean order of the child among his siblings was 3.06 2.23 rank. The mean number of children the guardian has with nocturnal enuresis was 1.47±0.98 children. The most common health problems the NE children suffered were: worry (23.1%) and hyperactivity(22.2%). Only 8.3% were suffering from UTI.

Table 2 shows that most children (79.6%) were delivered through normal delivery, 72.2% had a 9th gestational age at birth, 25.1% had both parents and 29.65 had a sibling suffer from bedwetting during childhood. For 34.1% the frequency of NE was once a month, while 15.7% had daily NE. The condition of the child during sleep was difficult for 64.9% of children, 51% had NE a long time after sleep and 52.8% were 6 months or more without bedwetting. Of them, 75% were circumcised and 72.3% drink a lot of water or any other beverage.

Table 1. Distribution of children with NE according to their demographics, child order, other children with NE and associated disorders (No=108)

Variable	No. (%)
The gender of the child?	
Female	27 (25)
Male	81 (75)
How old is the child?	
<10 years	52 (48.1)
≥10 years	56 (51.9)
(mean ± SD)	8.78 ± 3
The nationality of the child?	
Saudi	98 (90.8)
Non-Saudi	10 (9.2)
Where you live?	
South	2 (1.8)
East	41 (37.9)
North	8 (7.4)
West	9 (8.3)
Central	48 (44.6)
Family income	
<10000 SR	49 (45.5)
10000-30000 SR	40 (37)
>30000 SR	19 (17.5)
Mean number of family members with father and mother	6.69 ± 6.37
Who does the child live with?	
Father only	2 (1.8)
Mother only	7 (6.4)
Parents	98 (90.9)
Between mother & father	1 (0.9)
What is the order of the child among his siblings?	3.06 ± 2.23
How many of your children have or have had nocturnal enuresis? (mean ± SD)	1.47 ± 0.98
Does the child suffer from any of the following? (n=108)	
Intellectual disabilities	3 (2.7)
Physical paralysis	1 (0.9)
Diabetes	7 (6.4)
Sickle cell fracture	6 (5.5)
Birth defects	7 (6.4)
Epileptic or neurological disease	5 (4.6)
Does the child suffer from any of the following ?	
Autism	1 (0.9)
hyperactivity	24 (22.2)
Snoring	15 (13.8)
Apnea at night	5 (4.6)
Urinary tract infection	9 (8.3)
Weakness of the bladder muscles	4 (3.7)
Chronic constipation	6 (5.5)
Worry	25 (23.1)
Depression	4 (3.7)

Table 2. Distribution of children with NE according to their pregnancy and childbirth conditions, family history of NE and NE pattern (No=108)

Variable	No. (%)
What is the type of child's birth?	
Normal	86 (79.6)
CS	22 (20.4)
What is the gestational age when the child is born?	
7th	22 (20.4)
8th	8 (7.4)
9th	78 (72.2)
Did one or both parents suffer from bedwetting during childhood?	
No	66 (61.1)
Yes, Father	6 (5.5)
Yes, Mother	9 (8.3)
Yes both	27 (25.1)
Did any of the child's siblings suffer from bedwetting during childhood?	
No	69 (64)
No siblings	7 (6.4)
Yes	32 (29.6)
If yes, how many siblings are affected? (mean ± SD)	0.71 ± 0.1.1
Rate of nocturnal enuresis	
Daily	17 (15.7)
Once / week	20 (18.5)
2-4 times / week	34 (31.4)
Once / month	37 (34.4)
The condition of the child during sleep?	
Easy	38 (35.1)
Difficult	80 (64.9)
What time does bedtime urination occur?	
Any time after sleep	44 (40.7)
Shortly after sleep	9 (8.3)
Long time after sleep	55 (51)
Has the child been 6 months or more without bedwetting?	
No	51 (47.2)
Yes	57 (52.8)
Was the child circumcised?	
No, a female child	22 (20.4)
No	5 (4.6)
Yes	81 (75)
Does the child drink a lot of water or any other beverage?	
No	30 (27.7)
Yes	78 (72.3)
In the case of a urinary tract infection, how often? (mean SD)	1.83 1.58

Table 3 shows that the most common factor that surrounds the child at the beginning of the symptoms of bedwetting was family problems inside the house. Of the Guardians, 40.8% reported that the child's NE causes embarrassment or social shame for the child. The most common procedure done for management was Behavioral Stimulation Therapy (75.9%) and 55.6% reported improvement of the child after the intervention.

Table 3. Distribution of children with NE according to factors surrounding child at beginning of NE, effect on family and management (No=108)

Variable	No. (%)
The factors surrounding the child at the beginning of the symptoms of bedwetting:	
Having a newborn child (smaller than the child who suffers from urination)	21 (19.4)
The family has moved to another city	12 (11.1)
There are family problems inside the house	23 (21.2)
Separation of father and mother	8 (7.4)
The death of a relative	7 (6.4)
There are financial problems in the family that cause tension inside the home	12 (11.1)
Did the problem cause embarrassment or social shame for the child?	
No	64 (59.2)
Yes	44 (40.8)
Have you done one of the following procedures to get rid of bedwetting in the child ?	
Behavioral Stimulation Therapy	82 (75.9)
Bedwetting alarm	4 (3.7)
Exercises to strengthen the bladder muscles	8(7.4)
Ease of medicines	8 (7.4)
Surgery	2 (1.8)
If you used one of the previous procedures, did the child's condition improve after that?	
No	48 (44.4)
Yes	60 (55.6)

Table 4 shows that most of the guardians (49.1%) reported that the child with bedwetting takes a lot of the carer's time . While 59.4% reported that this experience never made them more connected to religious and spiritual matters and never caused them to understand the things that should be valued in life (23.1%). The majority (63.2%) reported that NE never caused additional financial burdens, but bedwetting has never improved their relationship with their husband/wife (69.6%). Almost a third (30.5%) reported that chronic stress in the family is never a consequence of having a child with bedwetting and only 6.4% reported that NE experience never helped them realize that every child has a unique personality and unique talents. The majority (64%) reported that a child with bedwetting never made them postpone or cancel some big vacation plans and 45.4% reported that family members become a little bit more tolerant of differences in other people, and more receptive to mental or physical differences between people. For 68.7%, NE never reduced the time parents spend with their friends and for 31.8% the child's condition never caused positive personal development, or the personal strength of the father or mother. For 76.1%, NE never made parents reluctant to call friends or acquaintances by phone. For 66.7% it never caused tension and tension between the spouses and for 69.5% NE never postponed any major purchases. 42.5% reported that raising a child who has difficulty makes life a little bit more meaningful for family members.

Table 4. Distribution of guardians of children with NE according their thoughts about family implications of having a child with bed-wetting (No=108)

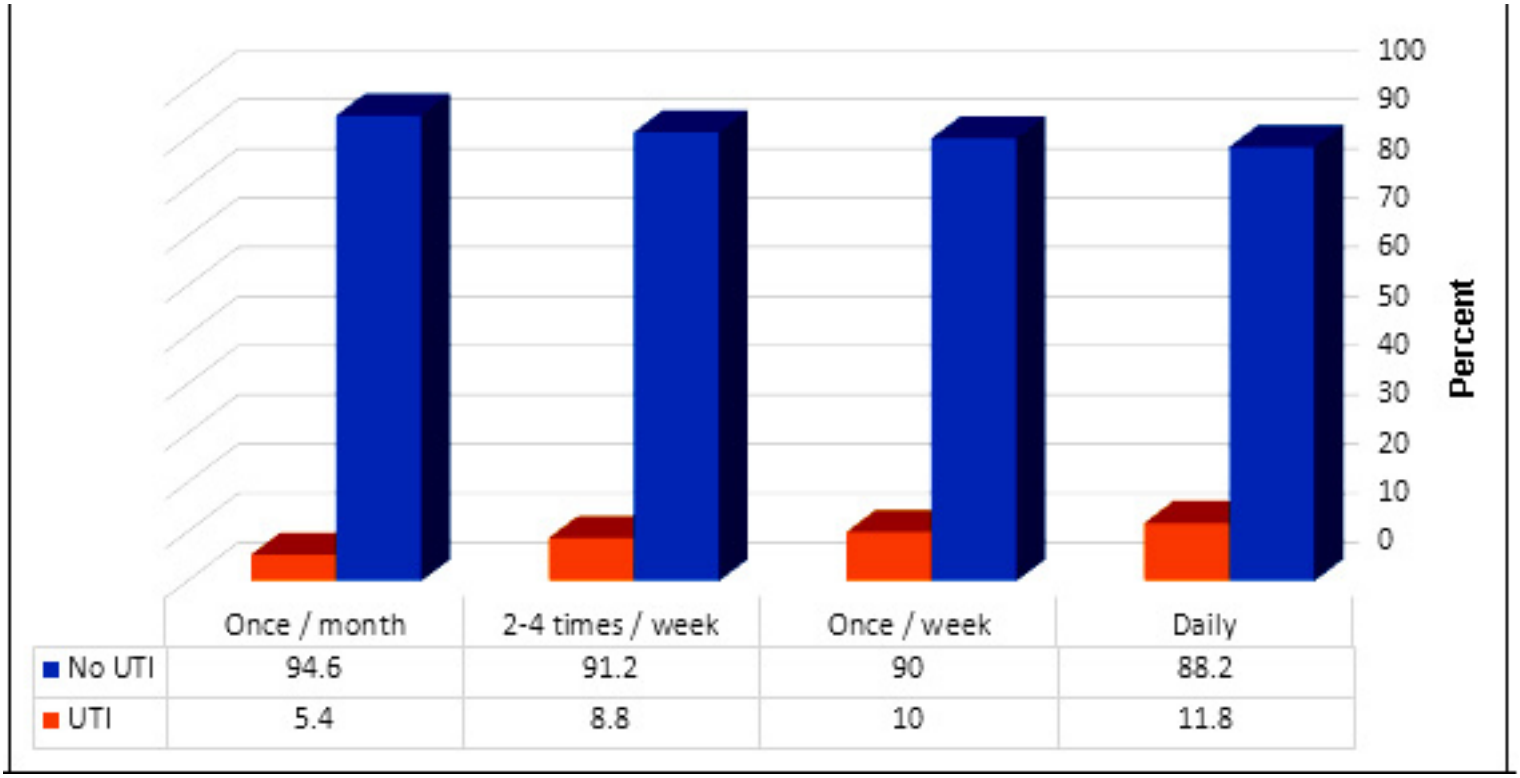
Variable	Never	Little	Moderate	Much
Caring for a child with bedwetting takes a lot of time	8 (7.4)	20 (18.5)	27 (25)	53 (49.1)
Having a child with bedwetting caused unwanted disruptions in the normal family routine	20 (18.5)	47 (43.5)	29 (26.6)	12 (11.1)
This experience (having a child with bedwetting) made us more connected to religious and spiritual matters	63 (59.4)	13 (12)	16 (14.8)	15 (13.8)
Having a child with bedwetting has caused additional financial burdens	68 (63.2)	23 (21.2)	10 (9.2)	7 (6.4)
Family members do more things for each other than they do for themselves	27 (25)	27 (25)	39 (38)	13 (12)
Having a child with bedwetting has improved my relationship with my husband/wife	75 (69.6)	21 (19.4)	5 (4.6)	7 (6.4)
Having a child with bedwetting reduced social contact outside the home	72 (66.8)	16 (14.8)	11 (10.1)	9 (8.3)
This experience (having a child with bedwetting) made us come to understand the things that should be valued in life	25 (23.1)	29 (28.8)	40 (37)	12 (11.1)
Chronic stress in the family is one of the consequences of having a child with bedwetting	33 (30.5)	19 (17.5)	38 (35.4)	18 (16.6)
This experience (having a child with bedwetting) helped me realize that every child has a unique personality and unique talents	7 (6.4)	19 (17.5)	40 (47.4)	31 (28.7)
Having a child with bedwetting made us postpone or cancel some big vacation plans	68 (64)	22 (20.4)	7 (6.4)	10 (9.2)
Family members become more tolerant of differences in other people, and more receptive to mental or physical differences between people	27 (25)	48 (45.4)	20 (18.5)	12 (11.1)
This condition (having a child with bedwetting) has reduced the time parents spend with their friends	73 (68.7)	17 (15.7)	7 (6.4)	10 (9.2)
The child's condition has caused positive personal development, or the personal strength of the father or mother	61 (31.8)	18 (16.6)	19 (17.5)	9 (8.3)
Because of this condition, parents are reluctant to call friends or acquaintances by phone	81 (76.1)	15 (13.8)	6 (5.5)	5 (4.6)
This experience has made family members more aware of people's needs and suffering of having a child with bedwetting	25 (23.1)	22 (20.4)	40 (38)	20 (18.5)
This situation caused tension and tension between the spouses	71 (66.7)	22 (20.4)	6 (5.5)	8 (7.4)
This experience taught me that there are so many blessings when having a child who has a difficulty/problem	15 (13.8)	21 (19.4)	42 (40)	29 (26.8)
Due to circumstances related to the child's condition, many major purchases have been postponed	74 (69.5)	16 (14.8)	8 (7.4)	9 (8.3)
Raising a child who has difficulty making life more meaningful for family members	28 (28.9)	46 (42.5)	15 (13.8)	16 (14.8)

Table 5 shows that male children, with an age <10 years had a significantly higher percentage of having daily NE (p=<0.05), while children who had NE 2-4 times / week had a significantly higher percentage of having any of the following medical conditions (Autism, hyperactivity , snoring, apnea at night, weakness of bladder muscles, chronic constipation, worry, depression) (p=<0.05). Children who were circumcised and those who drink a lot of water or any other beverage had a significantly higher percentage of having daily NE (p=<0.05). At the same time, children who had UTI had a significantly higher percentage of having daily NE (p=<0.05) (Figure 2).

Table 5. Relationship between NE frequency and children demographics, medical conditions, circumcision and drinking a lot of water or beverage

Variable	Rate of nocturnal enuresis				χ2	p-value
	Daily No. (%)	Once / week No. (%)	2-4 times / week No. (%)	Once / month No. (%)		
The gender of the child?						
Female	5 (29.4)	6 (30)	10 (29.4)	6 (16.2)	4.98	<0.001
Male	12 (70.6)	14 (70)	24 (70.6)	31 (83.8)		
How old is the child?						
<10 years	9 (52.9)	15 (75)	22 (64.7)	6 (16.2)	4.77	<0.001
≥10 years	8 (47.1)	5 (25)	12 (35.3)	31 (83.8)		
Does the child suffer from any of the following ?						
Autism	0 (0.0)	0 (0.0)	1 (2.9)	0 (0.0)	4.45	<0.001
Hyperactivity	6 (35.3)	4 (20)	12 (35.3)	2 (5.4)	13.20	<0.001
Snoring	3 (17.6)	3 (15)	8 (23.5)	1 (2.7)	9.99	<0.001
Apnea at night	0 (0.0)	0 (0.0)	5 (14.7)	0 (0.0)	14.12	<0.001
Weakness of bladder muscles	1 (5.9)	1 (5)	2 (5.9)	0 (0.0)	7.5	<0.001
Chronic constipation	0 (0.0)	1 (5)	3 (8.8)	2 (5.4)	7.34	<0.001
Worry	2 (11.8)	6 (30)	13 (38.2)	4 (10.8)	5.96	<0.001
Depression	1 (5.9)	0 (0.0)	3 (8.8)	0 (0.0)	6.17	<0.001
Was the child circumcised? No, a female child						
No	0 (0.0)	1 (5)	3 (8.8)	1 (2.7)	8.27	<0.001
Yes	12 (70.6)	14 (70)	24 (70.6)	31 (83.8)		
Does the child drink a lot of water or any other beverage?						
No	7 (41.2)	5 (25)	13 (38.2)	5 (13.5)	6.01	<0.001
Yes	10 (58.8)	15 (75)	21 (61.8)	32 (86.5)		

Figure 2. Relationship between NE frequency and having UTI



	Once / month	2-4 times / week	Once / week	Daily
No UTI	94.6	91.2	90	88.2
UTI	5.4	8.8	10	11.8

N.B.: ($\chi 2 = 8.27$, p-value = <0.001)

Discussion

Around the world, nocturnal enuresis (NE) is a frequent childhood condition that can be problematic for both children and their families. This study calculated the prevalence of nocturnal enuresis among children aged 5 to 18 in several Saudi Arabian locations, along with some factors, including demographics, child order, and associated disorders. It also provides description of the thoughts of guardians of children with NE. Finally, it explored the relationship between NE frequency and children's medical conditions, circumcision and drinking a lot of water or beverages.

In various parts of Saudi Arabia, the prevalence of having a child with NE was around 22.1%, with a higher prevalence among boys (68.8%). The prevalence is increased over the years, which required more attention by the specialized clinical provider. At tertiary military hospital, where the study by Alshahrani et al., 2018 was conducted, a frequency of NE was (18.5%), with a higher prevalence among boys [9]. Later in 2020 a country-wide survey comprising 2,148 replies, indicated a higher prevalence rate of (31.4%) [2].

Published local research showed, that prevalence of NE differs according to child's age with strong correlation between enuresis prevalence and age [1]. Alhifthy et al. (2021) reported, that the prevalence was highest in age group 5-7years (36.6%) and dropped as age increased, with a slight rise in prevalence in children aged 16–18 years (9.3%) compared to those aged 13–15 (8.9%) [8]. This is similar to our findings, as the prevalence was highest in children aged 5 to 10 (76.3%), and it reduced, reaching a low of (23.8%) in children older than 10 years. This distribution was also observed by Alshahrani et al. (2018) [9].

In contrast, some studies, showed that older age group had the highest prevalence [11], while others, found no appreciable variation in the prevalence of NE with age [10].

Regarding distribution of guardians of children with NE, common thoughts were caring for a child with bedwetting takes a lot of time and that this child is special.

Regarding the frequency of bedwetting, in this study 34% of the children with NE experienced 2-4 bouts of bedwetting, per week. Those who experienced a frequency of bedwetting episodes more than twice per week, were commonly reported by children with NE [13], [14].

The frequency of bedwetting could be affected by many factors. For example, this study showed that children who were circumcised and those who drink a lot of water or any other beverage had a significant higher percentage of having daily NE. However, there is no scientific evidence about the association between that circumstance and bedwetting.

Medical profile of a child, can affect the sleep quality [15]. Conditions including, autism, hyperactivity, snoring, apnea at night, weakness of bladder muscles, chronic constipation, worry, and depression were significantly associated with NE 2-4 times per week. The frequency was also associated with the UTI.

Moreover, families and caregivers had to some extent a positive response to the NE. Finding a solution is proof of admitting NE is a health issue. The common methods utilized by families and caregivers in our sample, were behavioral stimulation therapy (55, 68.8%), followed by medication and exercises to strengthen the bladder muscles (8.8%). Only 3.8% employed bedwetting alarms.

Other researchers observed a negative response towards NE. Alhifthy et al. (2021), reported that the majority of respondents (64.3%) did not try any therapy to manage their child's NE [8]. According to Pandey et al. (2019), just 13.2% of parents had implemented behavioral interventions for their children, while 79% had not [13]. Hamed et al. (2017) discovered that behavioral treatment was employed in 16.7% of instances and that families didn't intervene in the majority of a sample [14].

Seeking a medical consultation, is an early intervention that could prevent NE from developing as a chronic condition. However, a lower percentage of households used medical care, as only 29% of the participants received pharmaceutical care.

The effectiveness of the used therapies, was not evaluated or reported by local researchers. There is a need for depth interview and a clinical evaluation scale to measure which therapy is more effective for controlling NE among Saudi Children. As resolved by randomized trials of NE; alarm therapy and the use of desmopressin have been shown to be effective [15].

In addition, the different attitude toward early treatment of NE might be due to different socioeconomic status. A number of parents who had a higher education and income act positively toward child's urinary incontinence. As a result, it did not reflect on their quality of life. Most of participants thought that NE never had a negative impact on their quality of life.

Socioeconomics according to early evidence, determined the awareness and mindset for dealing with a health condition. However, the importance of seeking medical consultation is at a lower grade of parental knowledge [2,8]. Saudi parents usually prefer to deal with PNE themselves than to seek professional help. Similar behavior was observed in eastern countries, such as China and Korea [16].

Limitation

To our knowledge there was no similar studies which show or discuss this point. The study covered many aspects of NE which we believe strength the methods The study has some limitations. The researchers did not assess daytime functional bladder among children, and the study only interviewed parents regarding nocturnal enuresis. In patients with findings of overactive bladder, besides urotherapy, anticholinergic drugs may be useful.

Conclusion

NE occurs among children in various Saudi Arabian regions. Male gender, aged 5 to 10 and suffering from weakness of bladder muscles, chronic constipation, worry and depression were associated with NE and UTI. Families and caregivers utilized effective therapies such as alarm and behavioral stimulation, however, they do not look for medical assistance.

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