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Factors associated with delayed management of nocturnal enuresis: a cross-sectional study of parental perspectives

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ABSTRACT

Background. Nocturnal enuresis (NE) in the pediatric age group is a major health problem that can significantly affect both the child and the family. Despite the availability of effective treatments, many families delay seeking medical consultation.

Objective. This study aimed to assess parental knowledge and beliefs about NE and to identify factors associated with delayed medical consultation.

Methods. A cross-sectional study was conducted between January 2024 and January 2025 in Basrah City. Parents of children with NE were interviewed using a structured questionnaire that collected data on sociodemographic characteristics, clinical features, family beliefs, and management practices. Factors associated with delayed medical consultation were examined using univariate and multivariate logistic regression analyses. Results were presented as odds ratios (ORs) with 95% confidence intervals (CIs).

Results. A total of 210 parents participated in the study. Most children had primary NE (92.9%), and 60.5% were male. Delayed medical consultation was reported in 87.6% of cases. The most commonly reported reasons for delay were lack of awareness (62.4%) and high treatment cost (15.7%). In multivariate analysis, increasing age was associated with higher odds of delayed consultation (OR = 1.09, 95% CI: 1.03-1.15). In contrast, secondary NE (OR = 0.03, 95% CI: 0.004-0.157) and higher family income (OR = 0.12, 95% CI: 0.03-0.43) were associated with lower odds of delayed consultation.

Conclusion. Delayed management of NE is common in the Basrah population. Age, type of enuresis, and family income were key predictors of delayed medical consultation. Improving parental awareness and access to care may help promote earlier diagnosis and treatment of nocturnal enuresis.

Keywords: nocturnal enuresis, parental beliefs, family strategies, delayed medical consultation

INTRODUCTION

Nocturnal enuresis (NE) is a common pediatric condition characterized by intermittent urinary incontinence during sleep in children aged 5 years and older [1]. NE is categorized into primary and secondary types. Primary NE occurs in children older than 5 years who have never achieved consistent nighttime dryness, whereas secondary NE is diagnosed when bedwetting recurs after at least 6 months of previous nocturnal dryness [2].

It has been reported that nearly 10% of 7-year-olds, about 5% of 10-year-olds, and approximately 0.5%-1% of adults experience at least three episodes of NE per week [3]. Nevertheless, reported prevalence rates vary substantially across geographic regions and populations, reflecting the influence of cultural, environmental, and socioeconomic factors [3,4].

NE is a multifactorial disorder arising from genetic susceptibility, delayed bladder maturation, increased nocturnal urine production, impaired sleep arousal, and various environmental and psychosocial factors [3,5,6]. Other associated conditions include constipation, encopresis, and behavioral or psychological problems. Attention-deficit/hyperacti-

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vity disorder has been reported in approximately 20% of children with NE [6].

NE can have significant psychosocial consequences. It is often associated with feelings of embarrassment, anxiety, and low self-esteem in affected children and may also create stress for parents and caregivers. The condition may negatively affect quality of life and school performance. Despite these consequences, many families delay seeking professional medical advice, and fewer than one-third of parents seek consultation for associated psychological or behavioral concerns [7].

Management of primary nocturnal enuresis usually begins with parental education and behavioral interventions. Early management often focuses on simple lifestyle measures such as regulating fluid intake, encouraging the child to void before bedtime, and establishing regular toileting habits. Enuresis alarms may also be used as part of behavioral treatment [3,7,8]. If these measures are not effective, or in older children with persistent symptoms, pharmacologic therapy may be considered. Commonly prescribed medications include desmopressin, imipramine, and oxybutynin [6,8]. Behavioral interventions are often associated with better long-term outcomes, whereas medications such as desmopressin may provide faster short-term symptom control in selected patients [9].

Children with nocturnal enuresis are also more likely to experience behavioral or psychological difficulties than their peers. Previous studies suggest that such problems may occur three to four times more frequently in children with NE than in non-enuretic children [10]. For this reason, psychological support and behavioral strategies, including positive reinforcement and alarm therapy, are frequently recommended as part of comprehensive management [11].

Despite the availability of effective treatments, many children do not receive timely medical evaluation. Delayed consultation may occur because of limited awareness, social stigma, or financial barriers faced by families. Parents play a central role in recognizing the condition and deciding when medical advice should be sought. Their understanding and beliefs about NE can strongly influence how the problem is managed at home. However, information about parental knowledge and attitudes toward NE remains limited in many regions. In Iraq, only a few studies have explored how families perceive and manage this condition.

Therefore, this study aimed to assess parental knowledge, beliefs, and management practices regarding nocturnal enuresis among children in Basrah. In addition, the study examined the clinical characteristics of affected children and identified factors associated with delayed medical consultation.

METHODS

Study design and setting

This cross-sectional study was conducted between January 2024 and January 2025 in Basrah City, southern Iraq. Parents of children diagnosed with nocturnal enuresis (NE) were recruited during visits to outpatient clinics, private clinics, and inpatient pediatric services.

Parents were interviewed using a structured questionnaire. Data were collected and managed using REDCap (Research Electronic Data Capture), hosted at the University of Basrah. REDCap is a secure web-based platform that supports standardized data entry, data storage, and export to statistical software for analysis.

Questionnaire design and data collection

Data were collected using a structured electronic questionnaire developed specifically for this study. The questionnaire was designed based on previous literature on NE and the clinical experience of pediatric specialists. It was reviewed by two independent pediatric specialists to ensure the relevance, clarity, and content validity of the items.

The questionnaire included the following sections:

1. **Sociodemographic characteristics**
   - source of information (father, mother, or both)
   - parental educational level
   - family socioeconomic status
   - residence (city center or periphery)
2. **Patient characteristics**
   - age and sex
   - type of enuresis (primary or secondary)
   - frequency of bedwetting
   - associated urinary symptoms
   - family history of enuresis
3. **Medical history**
   - presence of comorbid conditions such as urinary tract disorders, neurological disorders, learning difficulties, developmental delay, behavioral problems, diabetes mellitus, or previous surgery involving the urinary system or spine.
4. **Clinical assessment and investigations**
   - performance of genital examination
   - investigations performed (general urine examination, renal ultrasound, urodynamic study)
5. **Treatment and management**
   - age at initiation of treatment
   - medications used (desmopressin, oxybutynin, imipramine, herbal remedies)
   - response to treatment
   - behavioral measures used by the family (voiding before sleep, fluid restriction, alarm use, awakening for voiding)

6. Family beliefs

- parental beliefs regarding the cause of nocturnal enuresis
- parental expectations about treatment outcomes.

The questionnaire was pilot tested on a small group of parents (n = 10) to assess clarity and comprehension before the main study. Minor wording modifications were made accordingly. The pilot testing confirmed that the questions were clear and understandable for participants.

Definition of delayed management

Delayed medical consultation was defined as failure to seek medical advice for nocturnal enuresis within 6 months after the child reached 5 years of age, despite persistence of symptoms. Parents were asked whether there had been a delay in seeking medical care, and responses were recorded as yes or no.

Statistical analysis

Statistical analysis was performed using SPSS version 24 (IBM Corp., Armonk, NY, USA). The obtained data were summarized as frequencies and percentages. Comparisons between groups were performed using the chi-square test and Fisher's exact test when expected cell counts were small.

To explore factors associated with delayed management, univariate logistic regression analysis was first performed. Variables showing potential association were then entered into a multivariate logistic regression model to identify independent predictors of delayed consultation.

Adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were calculated. Variables related to treatment strategies were not included in the regression analysis because they occur after medical consultation and therefore cannot predict delayed management. Model fit was evaluated using Cox & Snell R^2, Nagelkerke R^2, the Hosmer-Lemeshow goodness-of-fit test, and the area under the receiver operating characteristic (ROC) curve (AUC).

RESULTS

Sociodemographic and clinical characteristics of the study population

A total of 210 parents of children with nocturnal enuresis were included in this study. Of the chil-

TABLE 1. Sociodemographic characteristics of the study populations according to age groups

Characteristics	< 6.5 years (n = 61)	6.5–8 years (n = 119)	> 8 years (n = 30)	Total (n = 210)	p-value
Sex distribution					
Male	39 (63.9%)	63 (52.9%)	25 (83.3%)	127 (60.5%)	0.008
Female	22 (36.1%)	56 (47.1%)	5 (16.7%)	83 (39.5%)	
Residency					
Basrah city center	41 (67.2%)	74 (62.2%)	18 (60.0%)	133 (63.3%)	0.738
Basrah peripheries	20 (32.8%)	45 (37.8%)	12 (40.0%)	77 (36.7%)	
Mother's education					
Illiterate	1 (1.6%)	3 (2.5%)	3 (10.0%)	7 (3.3%)	0.052
Primary or below	16 (26.2%)	45 (37.8%)	6 (20.0%)	67 (31.9%)	
Secondary	27 (44.3%)	55 (46.2%)	14 (46.7%)	96 (45.7%)	
University	17 (27.9%)	16 (13.4%)	7 (23.3%)	40 (19.0%)	
Father's education					
Illiterate	0 (0.0%)	2 (1.7%)	1 (3.3%)	3 (1.4%)	0.321
Primary or below	10 (16.4%)	27 (22.7%)	4 (13.3%)	41 (19.5%)	
Secondary	32 (52.5%)	54 (45.4%)	10 (33.3%)	96 (45.7%)	
University	19 (31.1%)	36 (30.3%)	14 (46.7%)	69 (32.9%)	
Family income					
Low income	17 (27.9%)	40 (33.6%)	7 (23.3%)	64 (30.5%)	0.306
Middle income	37 (60.7%)	74 (62.2%)	20 (66.7%)	131 (62.4%)	
High income	7 (11.5%)	5 (4.2%)	3 (10.0%)	15 (7.1%)	
Type of NE					
Primary	54 (88.5%)	112 (94.1%)	29 (96.7%)	195 (92.9%)	0.312
Secondary	7 (11.5%)	7 (5.9%)	1 (3.3%)	15 (7.1%)	

Values are presented as n (%). Chi-square test was used for comparisons between groups, and Fisher's exact test was applied when expected cell counts were <5

Abbreviation: NE, nocturnal enuresis.

dren, 127 (60.5%) were male and 83 (39.5%) were female. The patients' ages ranged from 5 to 8.6 years, with a mean age of 7 years.

During the interviews, information was obtained from both parents in 63% of cases, while responses were provided by mothers alone in 19.7% and by fathers alone in 17.3%. Table 1 shows the demographic characteristics of the study population.

As shown in Table 1, a statistically significant difference in sex distribution across age groups was observed (p = 0.008). Most families lived in the Basrah city center (63.3%), while 36.7% resided in peripheral areas. Secondary education was the most commonly reported educational level among both mothers (45.7%) and fathers (45.7%). The majority of families reported a middle-income level (62.4%). Primary NE was the predominant form in this cohort, accounting for 92.9% of cases.

Secondary NE was reported in 15 children (7.1%). Among these patients, 12 children (80%) had bedwetting for less than 3 months, whereas 3 children (20%) had symptoms for a longer period. The association between the type of NE and selected clinical characteristics is presented in Table 2.

Urinary symptoms were present in 30.5% of the children, and their occurrence was significantly higher in those with secondary NE (p = 0.001). A positive family history of NE was documented in 47.6% of the study cohort; however, none of the children with secondary NE had a positive family history. Learning problems, developmental problems, chronic constipation, and snoring showed no significant association with the type of NE.

Among urinary symptoms, increased urinary frequency was the most commonly reported. Other symptoms included dysuria, loin pain, suprapubic pain, urgency, dribbling, hesitancy, and urinary retention. The distribution of urinary symptoms among the studied patients is presented in Figure 1.

Investigations, management strategies, and treatment outcomes

Genital examination was not performed in most patients (83.8%). Nephrologists and pediatric surgeons were more likely to perform genital examination than pediatricians and family physicians (p = 0.03).

Most patients underwent general urine analysis and renal ultrasound examination (97.1% and 87.6%, respectively), whereas a urodynamic study was performed in only two patients (1%). The frequency of these investigations among the study population is illustrated in Figure 2.

TABLE 2. Association between the type of NE and selected clinical characteristics

Characteristics	Type of NE		Total (n = 210)	p-value
	Primary (n = 195)	Secondary (n = 15)		
Urinary symptoms				
No	143 (73.3%)	3 (20.0%)	146 (69.5%)	0.001
Yes	52 (26.7%)	12 (80.0%)	64 (30.5%)	
Family history of nocturnal enuresis				
Positive	100 (51.3%)	0	100 (47.6%)	0.001
Negative	95 (48.7%)	15 (100.0%)	110 (52.4%)	
Learning problems				
No	194 (99.5%)	15 (100.0%)	209 (99.5%)	1.000
Yes	1 (0.5%)	0	1 (0.5%)	
Developmental problems				
No	188 (96.4%)	15 (100.0%)	203 (96.7%)	0.455
Yes	7 (3.6%)	0	7 (3.3%)	
Behavioral problems				
No	195 (100.0%)	9 (60.0%)	204 (97.1%)	0.001
Yes	0 (0.0%)	6 (40.0%)	6 (2.9%)	
Chronic constipation				
No	167 (85.6%)	14 (93.3%)	181 (86.2%)	0.405
Yes	28 (14.4%)	1 (6.7%)	29 (13.8%)	
Snoring				
No	160 (82.1%)	15 (100.0%)	175 (83.3%)	0.072
Yes	35 (17.9%)	0	35 (16.7%)	

Values are presented as n (%). Chi-square test was used for comparisons between groups, and Fisher's exact test was applied when expected cell counts were <5.
Abbreviation: NE, nocturnal enuresis.

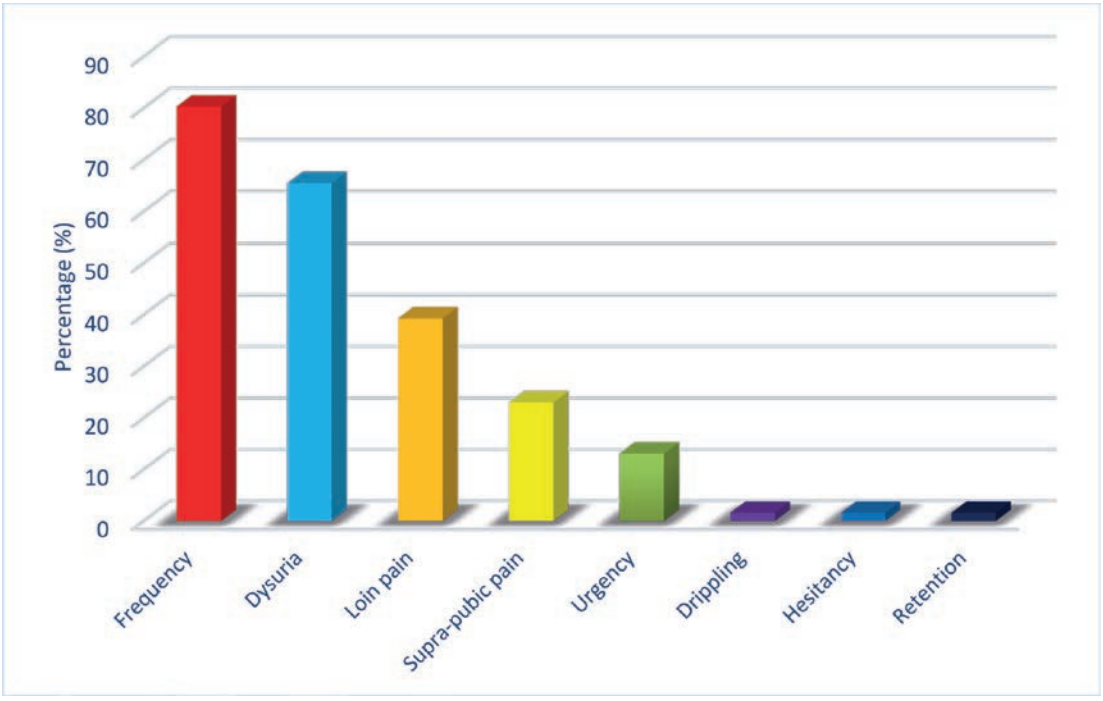

FIGURE 1. Urinary tract symptoms in patients with NE

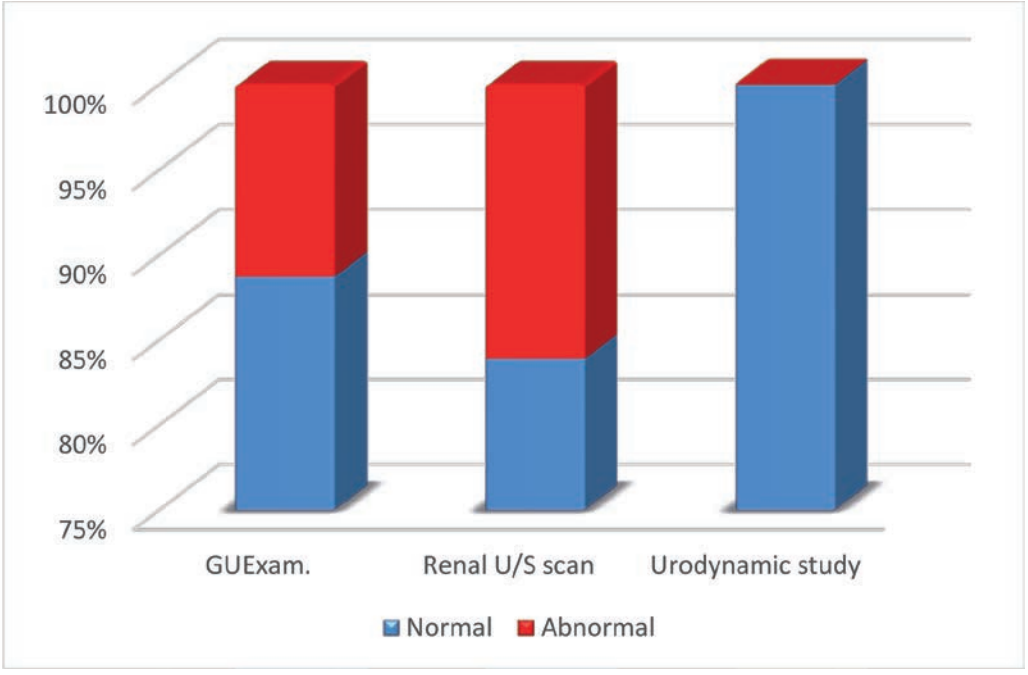

FIGURE 2. Frequency of investigations performed in children with nocturnal enuresis

TABLE 3. Family precautions and strategies used to manage nocturnal enuresis

Category	Action	n (%)
Precautions used by the family	Voiding before sleep	128 (65.6%)
	Water restriction	117 (60.0%)
	Awakening the child for voiding	69 (35.4%)
	Alarm bell use	0 (0.0%)
Family strategies toward the child	Psychological support	92 (55.3%)
	Punishment for wetting	26 (14.2%)
	Strictly following precautions	13 (7.1%)
	Sometimes following precautions	46 (25.0%)
	Taking no action	14 (7.7%)

Families reported several behavioral measures used to manage nocturnal enuresis. The most commonly reported precaution was voiding before sleep (65.6%), followed by restriction of evening fluid intake (60.0%) and awakening the child during the night to void (35.4%). More than half of the parents (55.3%) reported providing psychological support when bedwetting occurred, whereas 14.2% admitted punishing their child for wetting (Table 3).

Desmopressin was the most commonly used medication and was prescribed to 128 patients (61.0%). Oxybutynin was used in 89 patients (42.4%), while imipramine was used in 8 patients (3.8%). Herbal remedies were used in only 3 patients (1.4%), and no medication was given in 8 patients (3.8%).

Most patients showed a good response to treatment (75.7%), while 22.8% had partial improvement and only 1.5% showed no response.

Factors associated with delayed management of NE

Delayed treatment was reported in 184 patients (87.6%). According to parents, the most common reason for delayed management was lack of awareness (62.4%), followed by the high cost of medications (15.7%).

To explore factors associated with delayed management of NE, univariate logistic regression analysis was performed. Variables with very small frequencies were not included in the final regression analysis because of limited statistical power and unstable effect estimates. The results of the univariate analysis are presented in Figure 3.

The analysis showed that the type of nocturnal enuresis, age, family income, maternal education, and the presence of comorbid health conditions were significantly associated with delayed management. In contrast, sex, residence, father's education, urinary symptoms, developmental problems, behavioral problems, chronic constipation, and snoring were not significantly associated with delayed consultation.

For further analysis, variables with potential association in the univariate analysis were subsequently included in a multivariate logistic regression model. The results of the multivariate analysis are presented in Table 4.

Model fit statistics indicated moderate explanatory power (Cox & Snell $R^2 = 0.228$; Nagelkerke $R^2 = 0.451$). The Hosmer-Lemeshow goodness-of-fit test was statistically significant ($\chi^2 = 19.13$, df = 8, p = 0.014), suggesting some deviation from perfect calibration. However, the model demonstrated good discriminative ability, with an area under the recei-

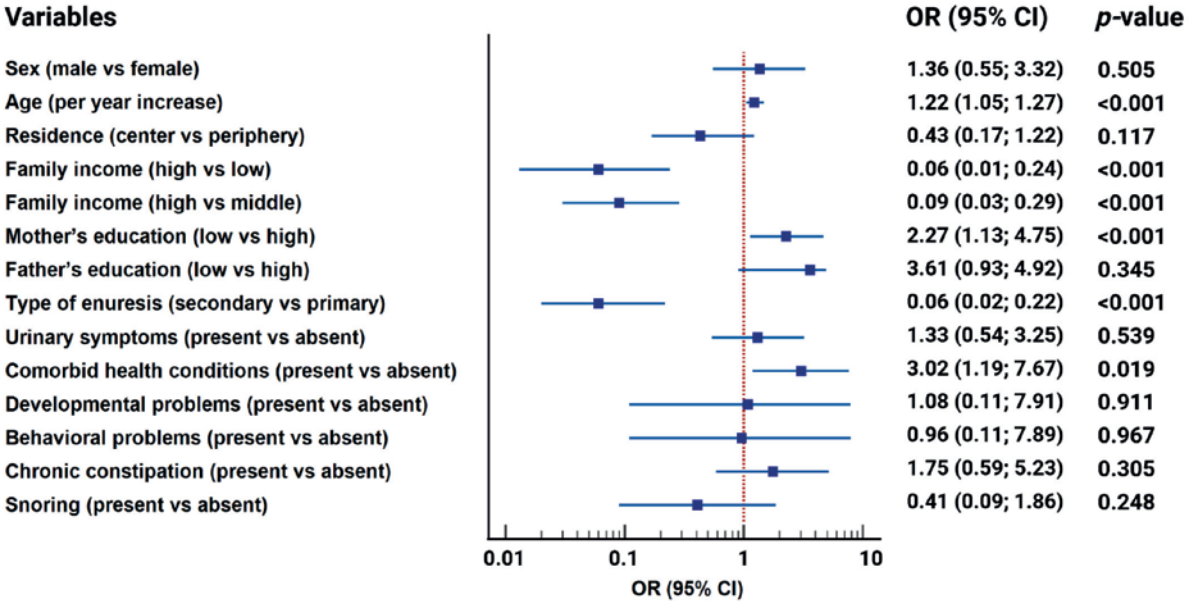

FIGURE 3. Univariate logistic regression analysis of factors associated with delayed medical consultation for NE (odds ratios with 95% confidence intervals)

TABLE 4. Multivariate logistic regression analysis of factors associated with delayed management of NE

Variable	Adjusted OR	95% CI	p-value
Type of enuresis (secondary vs primary)	0.03	0.004–0.157	0.001
Age (per year increase)	1.09	1.03–1.15	0.002
Family income (high vs low)	0.12	0.03–0.43	0.001
Mother's education (low vs high)	1.06	0.44–2.52	0.904
Comorbid health conditions (present vs absent)	1.39	0.40–4.78	0.601

ver operating characteristic curve (AUC) of 0.879 (95% CI: 0.826-0.920).

After adjustment for other variables, age, the type of NE, and family income remained independently associated with delayed management. Increasing age was associated with higher odds of delayed consultation. Children with primary NE had significantly higher odds of delayed management than those with secondary NE. In addition, higher family income was associated with lower odds of delayed consultation. Maternal education level and the presence of comorbid health conditions were not independently associated with delayed management.

DISCUSSION

Although NE is a common pediatric condition, limited research has explored parental beliefs, management practices, and factors contributing to delayed medical consultation in the Middle East, particularly in southern Iraq. The present study has two main objectives. First, we explored parents' beliefs about NE and the management strategies used by families, including behavioral and medical therapies. Second, we identified factors associated with delayed medical consultation. Unlike many previous studies that have primarily described the prevalence, clinical features, or treatment outcomes of NE, this study specifically quantifies how parental perceptions, economic constraints, and clinical characteristics are associated with delayed medical consultation.

Our findings showed that primary NE was the most frequent type (92.8%), compared with secondary NE (7.1%). These results are consistent with previous studies, including one conducted in Istanbul [13]. Males were also more frequently affected than females, which is in agreement with earlier reports [14,15]. A positive family history of NE was reported in 47.6% of children with primary NE. This finding supports the role of genetic predisposition in the development of primary NE, as described in previous studies [16].

The absence of urinary symptoms was observed in 69.5% of children in our study, indicating that many children had no significant urinary complaints. Most patients underwent routine investigations such as general urine examination and renal ultrasonography, whereas only a few patients (1%) underwent urodynamic testing, as this is not routinely performed in children with NE. Similar findings have been reported in other studies, in which urodynamic testing and endoscopy were not recommended routinely unless there were features suggestive of urinary tract infection or structural abnormalities [17].

Another important observation in our cohort was the low frequency of genital examination among children. Although many patients with uncomplicated NE have a normal physical examination, a focused genital and lumbosacral assessment remains important to exclude anatomical abnormalities, signs of bladder dysfunction, constipation-related findings, or occult neurological conditions [18]. The low frequency of such examinations may reflect variability in routine clinical practice and highlights the need for improved adherence to standard clinical assessment guidelines.

More than half of the children (56.8%) had no associated comorbid health conditions. This finding supports the concept that NE is often an isolated condition without significant underlying disease. It is also consistent with previous reports indicating that physical examination is usually normal in children with NE [18]. On the other hand, some children had a history of chronic constipation (13.8%). This finding is consistent with a study from Taiwan that reported a higher rate of constipation in children with NE than in non-enuretic children [19,20]. In addition, a proportion of enuretic children in our cohort had a history of snoring (16.7%), which may reflect a possible contribution of nocturnal hypoxia to the development of enuresis. A similar observation was reported in a study examining the relationship between NE and obstructive sleep apnea-hypopnea syndrome, in which 16.7% of children also presented with NE [21].

Two main treatment approaches were reported by families: behavioral measures and medications. Behavioral strategies were the most commonly used. The most frequent practices were voiding before sleep (65.6%) and restricting evening fluid intake (60.0%). Similar findings were reported in the study by Essawy et al. [22]. In addition, 35.4% of parents woke their children at night to void. A study from Sweden also found that scheduled awakening for voiding was more effective than placebo in reducing bedwetting episodes [23]. Pharmacologic treatment was also used in many cases, mainly with desmopressin and oxybutynin. Most children showed good improvement with treatment, in line with published data [24,25]. Overall, these results suggest that parents usually begin with simple behavioral measures, while medications are more often used once medical care has been sought.

A key finding of this study was the high proportion of delayed medical consultation. Most parents (87.6%) reported that they did not seek medical advice soon after the onset of NE. The most frequently reported reason for delay was lack of awareness, reported by 62.4% of parents. Many families believed that bedwetting would resolve natu-

rally with age. Similar misconceptions have been documented in studies from Saudi Arabia, Turkey, and China, where parents often regarded bedwetting as a normal developmental stage rather than a medical condition requiring intervention [26-28].

Multivariate analysis identified several independent predictors of delayed consultation. In our cohort, increasing age, primary NE, and low family income were associated with higher odds of delay. Although higher maternal education level and the presence of comorbid conditions were significantly associated with delayed consultation in the univariate analysis, these associations were no longer significant in the multivariate model. Our findings reflect the tendency of parents to adopt a wait-and-see approach during the early years of the condition. Similar patterns have been reported in other studies in which parents delayed consultation for several years after symptom onset. In parallel with our results, a 2024 review on health education in NE noted that many parents do not seek treatment promptly and that only 2.1%-55% of parents across studies seek medical care for children with NE, indicating substantial delay and under-treatment [29].

The type of enuresis also influenced the timing of medical consultation. Our results showed that children with primary NE were more likely to experience delayed consultation than those with secondary NE. Parents may consider primary NE a normal developmental phase that resolves spontaneously with age, leading to postponement of medical care. In contrast, recurrence of symptoms in secondary NE may prompt earlier concern and medical evaluation.

Our results regarding the impact of family income are consistent with earlier research. According to a recent systematic review on NE and health education, children from low-income households are more likely to have NE, and the associated treatment costs and long-term care may impose a financial burden that limits access to care [28]. Furthermore, a 2024 study based on NHANES data found that families with higher socioeconomic status were more likely to seek timely medical intervention, whereas those from lower-income backgrounds often postponed consultation for urinary problems [29]. Overall, our findings underscore the critical importance of parental awareness and socioeconomic determinants in the management of NE. Improving public understanding of this condition, together with better access to healthcare services, may facilitate earlier diagnosis and treatment.

Our study has several strengths. It provides contemporary local data on nocturnal enuresis in Basrah and examines parental beliefs, management strategies, and factors associated with delayed medical consultation. The study also used a structured questionnaire and multivariate logistic regression analysis, which allowed identification of factors independently associated with delay in seeking medical consultation.

However, the study also has several limitations. First, because of the cross-sectional design, causal relationships cannot be established. Second, the collected data relied on parental reporting and may therefore be subject to recall bias. Third, the study was conducted in a single urban locality, which limits the generalizability of the findings to other regions. In addition, some clinical variables were represented by only a small number of cases, which may have reduced the ability to detect other specific associations. Finally, the Hosmer-Lemeshow test indicated imperfect model calibration, which may be related to sample size imbalance and the relatively small number of non-delayed cases. Therefore, the regression findings should be interpreted with caution.

CONCLUSION

Delayed medical consultation for NE is common among children in Basrah. Lack of parental awareness and socioeconomic factors appear to play an important role in postponing medical care. Increasing age, primary enuresis, and low family income were associated with higher odds of delayed consultation. Improving parental education and access to healthcare services may encourage earlier medical evaluation and better management of NE. Future studies involving larger and more diverse populations are needed to further explore parental perceptions and barriers to early consultation.

Ethics approval and consent to participate

The study protocol was reviewed and approved by the Institutional Ethics Committee of the Medical Ethical Committee of the Department of Pediatrics, College of Medicine, University of Basrah (no. 33702 dated January 03, 2024). Participation was voluntary, and all information was kept confidential. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Availability of data and materials

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Use of AI

We have not used any AI for proofreading purpose, but we checked thoroughly the accuracy of data

we provided and we are responsible for the provided data.

Conflict of interests

The authors declare they have no competing interests.

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This research received no external funding.

Authors' contributions

All authors equally contributed to the study conception and design, data collection and analysis, interpretation of the results, reviewed the manuscript, and approved the final version for publication.

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