



Research Article

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Association of Infancy Breastfeeding with Childhood Mono-Symptomatic Enuresis in a Sample from Baghdad City/Iraq

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Abstract

Background: Enuresis is a common pediatric disorder that negatively affects children's emotional well-being and family functioning. Its etiology is multifactorial, involving genetic, biological, and environmental influences. Early-life feeding practices, particularly breastfeeding, have been suggested as potential protective factors. Understanding these relationships may improve preventive and management strategies. **Objectives:** To assess the association between breastfeeding history and enuresis among children aged 6–14 years in Baghdad and to evaluate the role of risk factors including family history, body mass index, and selected sociodemographic characteristics. **Methods:** A case–control study was conducted from January to December 2025 on 200 children (6–14 years). The sample comprised 100 children with primary enuresis (cases) recruited from a pediatric clinic and 100 age- and sex-matched controls without enuresis from primary healthcare centers. Children with neurological disorders, urinary tract abnormalities, diabetes mellitus, sleep disorders, or medication use were excluded. Data were collected through structured maternal interviews covering sociodemographic characteristics, family history, and feeding practices. **Results:** Obesity was more frequent among cases than controls (52% vs. 26%). Bottle feeding (41% vs. 15%) and positive family history (74% vs. 16%) were also higher among cases. Logistic regression showed increased odds of enuresis with overweight (OR=3.533), obesity (OR=3.333), family history (OR=5.195), bottle feeding (OR=4.278), low socioeconomic status (OR=2.614), and parental loss (OR=76.20). Breastfeeding duration showed a protective effect (OR=0.215–0.273). **Conclusions:** Breastfeeding is protective against primary enuresis, while obesity and adverse socioeconomic factors increased risk.

Keywords: Breastfeeding; Family history; Mono-symptomatic enuresis; Obesity; Socioeconomic status.

أقتران الرضاعة الطبيعية أثناء مرحلة الطفولة مع التبول أحادي الأعراض في عينة من مدينة بغداد/العراق

الخلاصة

الخلفية: التبول هو اضطراب شائع في طب الأطفال يؤثر سلباً على الصحة النفسية للأطفال ووظائفهم الأسرية. أسبابه متعددة العوامل، ويشمل تأثيرات جينية وبيولوجية وبيئية. تم اقتراح ممارسات التغذية في مرحلة الحياة المبكرة، وخاصة الرضاعة الطبيعية، كعوامل حماية محتملة. فهم هذه العلاقات قد يحسن استراتيجيات الوقاية والإدارة. **الأهداف:** تقييم العلاقة بين تاريخ الرضاعة الطبيعية والتبول بين الأطفال الذين تتراوح أعمارهم بين 6–14 سنة في بغداد وتقييم دور عوامل الخطر بما في ذلك التاريخ العائلي، ومؤشر كتلة الجسم، والخصائص الاجتماعية الديموغرافية المختارة. **الطرائق:** أجريت دراسة حالة-شاهد من يناير إلى ديسمبر 2025 على 200 طفل (6–14 سنة). شملت العينة 100 طفل يعانون من حالة من التبول الأولي تم اختيارهم من عيادة أطفال، و100 ضابط متطابق عمرياً وجنسياً بدون حالة تبول من مراكز الرعاية الصحية الأولية. تم استبعاد الأطفال الذين يعانون من اضطرابات عصبية، أو اضطرابات في المسالك البولية، أو مرض السكري، أو اضطرابات النوم، أو استخدام الأدوية. تم جمع البيانات من خلال مقابلات منظمة مع الأمهات تغطي الخصائص الاجتماعية والديموغرافية، وتاريخ العائلة، وممارسات التغذية. **النتائج:** كانت السمنة أكثر شيوعاً بين الحالات مقارنة بالمجموعة الضابطة (52% مقابل 26%). كما كانت الرضاعة بالزجاجة (41% مقابل 15%) والتاريخ العائلي الإيجابي (74% مقابل 16%) أعلى بين الحالات. أظهر الانحدار اللوجستي زيادة في فرص حدوث التبول مع زيادة الوزن (OR=3.533)، السمنة (OR=3.333)، التاريخ العائلي (OR=5.195)، الرضاعة بالزجاجة (OR=4.278)، الوضع الاجتماعي الاقتصادي المنخفض (OR=2.614)، وفقدان الوالدين (OR=76.20). أظهرت مدة الرضاعة الطبيعية تأثيراً وقائياً (OR=0.215–0.273). **الاستنتاجات:** الرضاعة الطبيعية تحمي من التبول الأولي، بينما السمنة والعوامل الاجتماعية والاقتصادية السلبية تزيد من الخطر.

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INTRODUCTION

Childhood monosymptomatic enuresis refers to bedwetting in children aged 5 or older without any daytime urinary symptoms or history of bladder dysfunction. It is primarily caused by a combination of deep sleep, a small functional bladder capacity, or an overproduction of urine overnight [1-3]. Enuresis is defined as the repeated, involuntary voiding of urine during sleep in a child aged 5 years or older, in

the absence of congenital or acquired defects of the nervous system or urinary tract. It represents the most common urologic complaint seen in pediatric primary care and specialty clinics. This condition carries a considerable emotional and practical burden for both affected children and their families [4-6]. Children with nocturnal enuresis and their families have a markedly reduced quality of life. The condition is common and highly distressing, leading to shame, fear of peer discovery, and significant

psychological stress—often worsened by punitive parental responses [7-9]. Additionally, nocturnal enuresis can contribute to sleep disturbances, leading to nighttime sleep deprivation. As a result, affected children may struggle with poor concentration in school, which can negatively impact academic performance. The condition also significantly disrupts social functioning, with surveys showing that bedwetting is perceived as the third most distressing issue for affected children—surpassed only by parental conflict and divorce [10,11]. Although numerous studies have investigated the relationship between breastfeeding during infancy and childhood mono-symptomatic enuresis, several important gaps remain. In particular, it is not yet clear whether breastfeeding reduces the risk of bedwetting at school age or which specific aspects of breastfeeding may influence this association. Furthermore, other potential risk factors for enuresis such as family history, body mass index, and various sociodemographic factors require further clarification. Addressing these gaps may contribute to improved prevention, earlier diagnosis, and more effective management strategies, ultimately enhancing the quality of life for affected children. This study aims to assess the association between the history of breastfeeding and bedwetting among Iraqi children aged 6–14 years and identify the association between potential risk factors, including family history of enuresis, body mass index, and selected sociodemographic factors, and the presence of enuresis.

METHODS

Study design and setting

An observational analytical case–control study was carried out on pediatric patients over a one-year period from January 1st to December 31st, 2025, from the Children Welfare Teaching Hospital, Medical City, and a control group (CG) of 100 children without enuresis selected from primary health care centers during the same period. This observational study included 200 children and adolescents aged 6 to 14 years, divided equally into two groups: an enuretic group (EG) consisting of 100 children with primary enuresis and a control group (CG) of 100 children without enuresis. Cases and controls were matched for age, sex, and socioeconomic status.

Sampling technique and collection tool used

A convenience sampling technique was employed in this study, whereby participants were selected based on their availability and accessibility during the study period. Children with primary mono-symptomatic enuresis (cases) were recruited from those attending a pediatric consultation clinic, while controls were selected from children visiting primary healthcare centers for routine care. This non-probability sampling method was chosen due to practical

considerations, including time constraints, ease of access, and feasibility within the clinical setting. Data were collected using a predesigned questionnaire based on previous studies [12-16], through direct interviews with parents or guardians after obtaining their verbal consent to participate in the study. The questionnaire includes different types of questions (closed-ended and multiple-choice responses). and it consists of four sections: 1) Socio-demographic information containing 12 questions that provides information about weight, height, body mass index, child age, gender, gestational age (preterm < 37 weeks, term ≥ 37 weeks), birth weight, parents dead (none, father, mother, or both), marital status of parents (together, divorced, or widowed), child living with (parents, mother, father, or other), child order (first, second, third, or more), number of births (single or twin), and family size (nuclear or extended). 2) Socio-economic characteristics, including father education (illiterate, primary, secondary, university, or higher); mother education (illiterate, primary, secondary, university, or higher); father occupation (employed, not working, or retired); mother occupation (employed, not working, or retired free); family income (Family has house: (Yes/No); Family has car: (Yes/No); and Parental smoking questions: (None, One parent smokes, Both)). 3) Child nocturnal enuresis and medical history: including 9 questions; the duration of enuresis frequency: (< 2 times/week, > 2 times/week, occasionally (less than once per week or irregularly, without a fixed pattern)); there is morning bedwetting enuresis: (Yes/No); there is a continuous dry period > 6 months: (Yes/No); family history of enuresis: (Parents, Siblings, Both, Second-degree relative, Others, No family history); does the child consume a high number of fluids before sleep: (Yes/No); what age of toilet training starts: (< 12 months, 12-24 months, > 24 months); and questions regarding treatment for enuresis: (Yes/No) if yes: type of treatment: (waking to void behavioral therapy alarm and drugs). 4) Feeding history involving 2 questions: exclusive breastfeeding, mixed feeding, bottle feeding, and duration of continuous breastfeeding (0-6 months, 7-12 months, 13-18 months, and 19-24 months).

Pilot study

A pilot study was done on ten participant mothers who had children with primary enuresis, and these participants were excluded from the study sample. The purpose was to determine the time required to complete data collection. Several modifications were implemented in the questionnaire, including refining available response options and adjusting completion time to ensure greater clarity, validity, and practicality of the instrument.

Ethical considerations

The research proposal was thoroughly reviewed and approved by the Ethical and Scientific Committee of

the Iraqi Board for Family Medicine. Participants were fully informed about the study's objectives, and their consent was obtained. The confidentiality of collected data was assured, and the information was used only for the purpose of this study.

Statistical analysis

Data were submitted and analyzed using the Statistical Package for the Social Sciences (SPSS, version 26). Categorical variables were presented as frequencies and percentages. Chi-square test: was used to analyze associations between these variables. The Firth correction was applied to selected variables due to sparse cell counts and quasi-complete separation, which could bias standard maximum likelihood estimates. By employing a penalized likelihood approach, this method provided more stable and less reliable coefficient estimates. The analysis was implemented using Stata software.

Binary logistic regression analysis: to identify independent predictors of enuresis. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to quantify the strength of associations. Graphical presentations, including bar charts, were used to illustrate the distribution of clinical data. Statistical significance was considered at $p < 0.05$.

RESULTS

Table 1 demonstrates the age distribution of the studied participants, showing that the largest proportion in both groups belonged to the 11–14 years age category, accounting for 47.0% in the first group and 51.0% in the second group. Children aged 8–10 years represented 22.0% of the first group and 24.0% of the second group. The 5–7-year age group comprised 31.0% and 25.0% of the two groups, respectively.

Table 1: Studied variables of children with enuresis

Variables		Cases (n=100)	Controls (n=100)
Age groups (year)	6-7	31(31)	25(25)
	8-10	22(22)	24(24)
	11-14	47(47)	51(51)
Gender	Male	51(51)	44(44)
	Female	49(49)	56(56)
Gestational age (weeks)	Preterm <37	5(5)	2(2)
	Term ≥ 37	95(95)	98(98)
BMI classification	Underweight	12(12)	11(11)
	Normal weight	30(30)	53(53)
	Overweight	6(6)	10(10)
	Obese	52(52)	26(26)
Family history	Parents	7(7)	0(0.0)
	Siblings	28(28)	10(10)
	Others	19(19)	6(6)
	No family history	22(22)	84(84)
	> than one option	4(4)	0(0.0)
Drinking fluid before sleep	Second relatives	20(20)	0(0.0)
	No	48(48)	40(40)
WC training	Yes	52(52)	60(60)
	<12 months	2(2)	8(8)
	12-24 months	39(29)	43(43)
	> 24 months	59(59)	49(49)
Feeding history	Mixed feeding	36(36)	49(49)
	Bottle feeding	41(41)	15(15)
	Exclusive breast feeding	23(23)	36(36)

Values are presented as frequency and percentage. WC training: Water closet; BMI: Body mass index.

In terms of gender, males were slightly more represented among cases (51.0%) compared to controls (44.0%), whereas females constituted 49.0% of cases and 56.0% of controls. Most children in both groups were born at term (≥37 weeks), with 95.0% of cases and 98.0% of controls, while preterm births (<37 weeks) were relatively uncommon (5.0% and 2.0%, respectively). For BMI classification, obesity was more prevalent among cases (52.0%) than controls (26.0%), while a normal weight was more common among controls (53.0%) compared to cases (30.0%). Underweight status was observed in 12.0% of cases and 11.0% of controls, while overweight was relatively rare (6.0% and 10.0%, respectively). Concerning family history, a notable proportion of cases reported enuresis among siblings (28.0%), parents (7.0%), or other relatives (19.0%), with some indicating more than one affected relative (4.0%) or

second-degree relatives (20.0%); in contrast, 84.0% of controls reported no family history of enuresis. When asked about fluid intake before sleep, 52.0% of cases and 60.0% of controls reported consuming fluids, while the remainder did not. Toilet training (WC training) duration varied, with most cases (59.0%) and nearly half of controls (49.0%) trained after 24 months, while training between 12 and 24 months was reported in 39.0% of cases and 43.0% of controls. Early toilet training (<12 months) was rare in both groups (2.0% and 8.0%, respectively). Regarding feeding history, bottle feeding was notably more frequent in cases (41.0%) than controls (15.0%), whereas mixed feeding was reported in 36.0% of cases and 49.0% of controls. Exclusive breastfeeding was more common among controls (36.0%) compared to cases (23.0%), as shown in Table 1. The association between the studied

variables and the presence of enuresis in children is discussed. A statistically significant association was found between body mass index (BMI) classification and enuresis ($p=0.001$). Obesity was more common among enuretic children, with 52.0% classified as obese compared to 26.0% of controls. A highly significant difference was also observed in relation to

family history of enuresis ($p=0.000$). While 28.0% of children with enuresis had a positive family history—reported in siblings—feeding history finally showed a significant association with enuresis ($p=0.000$). Bottle feeding was notably more common among enuretic children (41.0%) than among controls (15.0%) (Table 2).

Table 2: Association of studied variables of children with and without enuresis

Variables		Cases (n=100)	Controls (n=100)	p-value
Age groups (year)	6-7	31(31)	25(25)	0.778
	8-10	22(22)	24(24)	
	11-14	47(47)	51(51)	
Gender	Male	51(51)	44(44)	0.322
	Female	49(49)	56(56)	
Gestational age (week)	Preterm <37	5(5)	2(2)	0.248
	Term ≥ 37	95(95)	98(98)	
	Underweight	12(12)	11(11)	
BMI classification	Normal weight	30(30)	53(53)	0.001
	Overweight	6(6)	10(10)	
	Obese	52(52)	26(26)	
Family history	Parents	7(7)	0(0.0)	0.001
	Siblings	28(28)	10(10)	
	Others	19(19)	6(6)	
	No family history	22(22)	84(84)	
	> one option	4(4)	0(0.0)	
Fluid before sleep	Second relatives	20(20)	0(0.0)	0.254
	No	48(48)	40(40)	
WC training	Yes	52(52)	60(60)	0.094
	< 12 months	2(2)	8(8)	
	12-24 months	39(39)	43(43)	
Feeding history	> 24 months	59(59)	49(49)	0.001
	Mixed feeding	36(36)	49(49)	
	Bottle feeding	41(41)	15(15)	
	Exclusive breast feeding	23(23)	36(36)	

Values are presented as frequency and percentage. Chi-square test was used and considered significant at $p<0.05$. WC training: Water closet
BMI: Body mass index.

About comparison of family-related socio-demographic variables between children with enuresis (cases) and those without enuresis (controls). This study found that parental survival status had a statistically significant difference ($p=0.018$), among the enuretic group, 96 children (96.0%) had both parents alive, while 4 children (4.0%) had both parents deceased. Living arrangements were significantly associated with enuresis ($p=0.038$). The majority of children in both

groups lived with their parents, but the percentage was slightly lower in the enuretic group (91 children; 91.0%) compared to the controls (95 children; 95.0%). Family structure also showed a significant difference ($p=0.029$). In the enuretic group, 54 children (54.0%) belonged to extended families. A statistically significant association between SES level and case/control ($p=0.002$). Low SES was markedly more prevalent among cases (79.0%) compared to controls (59.0%) (Table 3).

Table 3: Association of socio-demographic characteristics of the studied families

Variables		Cases (n=100)	Controls (n=100)	p-value
Dead parents	None	96(96)	94(94)	0.018
	Both	4(4)	0(0.0)	
	Father	0(0.0)	4(4)	
	Mother	0(0.0)	2(2)	
Marital status	Together	94(94)	98(98)	0.130
	Divorced	4(4)	0(0.0)	
	Widow	2(2)	2(2)	
Child living	Parents	91(91)	95(95)	0.038
	Father	7(7)	0(0.0)	
	Mother	1(1.0)	3(3)	
	Other	1(1.0)	2(2)	
Family size	Extended	54(54)	69(69)	0.029
	Nuclear	46(46)	31(31)	
Child order	First	28(28)	35(35)	0.316
	Second	31(31)	34(34)	
	Third or more	41(41)	31(31)	
Parental smoking	None	35(35)	49(49)	0.061
	One parent smoke	63(63)	51(51)	
	Both	2(2)	0(0.0)	
Number of births	Single	97(97)	99(99)	0.312
	Twin	3(3)	1(1.0)	
SES	Low	79(79)	59(59)	0.002
	Middle	21(21)	41(41)	

Values are presented as frequency and percentage. Chi-square test was used and considered significant at $p<0.05$. SES: Socio-economic status.

This study also sought the distribution of duration for breastfeeding among both cases and control groups. Our findings about cases (59 children with enuresis) showed that the most frequent duration was 19–24 months, reported in 20 children (33.9%), followed by 0–6 months in 17 children (28.8%); a shorter duration of 7–12 months was noted in 10 children (16.9%), while 12 children (20.3%) were breastfed for 13–18 months (Figure 1).

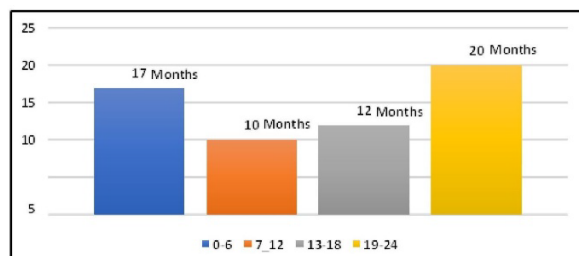


Figure 1: Duration of breast feeding among cases group (n=59). Illustrated the distribution of breastfeeding duration among the 59 children with enuresis. The most frequent duration was 19–24 months, reported in 20 children (33.9%), followed by 0–6 months in 17 children (28.8%). A shorter duration of 7–12 months was noted in 10 children (16.9%), while 12 children (20.3%) were breastfed for 13–18 months.

Approximated results were observed among the control group (86 children without enuresis); the highest proportion was breastfed for 19–24 months, accounting for 30 children (34.9%), followed closely by 0–6 months with 27 children (31.4%); a total of

15 children (17.4%) were breastfed for 13–18 months, and 14 children (16.3%) for 7–12 months (Figure 2).

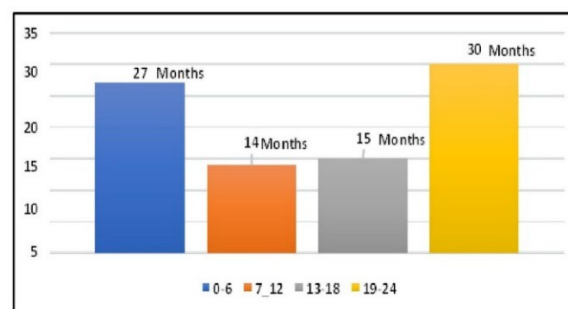


Figure 2: Duration of breast feeding among the control group (n=86). Demonstrated the distribution of breastfeeding duration among the 86 children in the control group (without enuresis). The highest proportion was breastfed for 19–24 months, accounting for 30 children (34.9%), followed closely by 0–6 months with 27 children (31.4%). A total of 15 children (17.4%) were breastfed for 13–18 months, and 14 children (16.3%) for 7–12 months.

In the logistic regression analysis, several socio-demographic characteristics showed significant associations with the likelihood of having enuresis. Compared with females, males had higher odds of enuresis (OR= 1.325), reflecting a 32.5% increase in risk, although this association was not statistically significant. Children classified as overweight (OR= 3.533) and obese (OR= 3.333) had markedly higher odds, corresponding to 35.3% and 33.3% increases, respectively (Table 4).

Table 4: Comprehensive assessment of socio-demographic, familial, and feeding-related determinants of childhood enuresis using logistic regression with fifth penalized correction

Predictors	B (Estimate)	OR	95% CI	p-value
Gender (Ref: Female)				
Male	0.281	1.325	0.759-2.31	0.322
BMI classification (Ref: Healthy weight)				
Underweight	0.606	1.833	0.713-4.712	0.208
Overweight	1.262	3.533	1.845-6.766	<0.001
Obese	1.204	3.333	1.092-10.18	0.035
Family history (Ref: No history)				
Parents	-0.49	0.365	0.006-20.138	0.623
Siblings	0.31	1.878	0.035-98.162	0.755
Others	0.11	1.243	0.023-65.435	0.914
Second relatives	0.82	5.195	1.10-269.361	0.041
> one option	-0.73	0.219	0.003-12606	0.463
Dead parents (Ref: None of them)				
Both	2.06	76.20	1.245-461.389	0.039
Father	0.27	1.8	0.026-121.702	0.785
Mother	0.27	1.8	0.027-121.702	0.785
Feeding history (Ref: Exclusive breast feeding)				
Mixed feeding	0.14	1.15	0.584-2.26	0.686
Bottle feeding	1.454	4.278	1.942-9.42	<0.001
Child living (Ref: Other)				
Father	1.81	41.444	0.736-231.472	0.044
Mother	0.24	1.666	0.027-99.61	0.807
Parents	-0.12	0.777	0.012-49.902	0.906
Family size (Ref: Extended)				
Nuclear	0.64	1.896	1.064-3.38	0.08
SES classification (Ref: Middle)				
Low	0.961	2.614	1.4-4.883	0.003
Duration of breast feeding (Ref: On bottle feeding)				
0-6	-1.54	0.215	0.091-0.507	<0.001
7-12	-1.41	0.244	0.089-0.672	0.006
13-18	-1.3	0.273	0.103-0.722	0.009
19-24	-1.48	0.228	0.099-0.522	<0.001

OR: Odds Ratio; CI: Confidence Interval; BMI: Body Mass Index; SES: Socioeconomic Status.

Within the family history categories, having second-degree relatives with enuresis showed a significant

rise in risk (OR= 5.195), whereas other categories demonstrated wide confidence intervals consistent

with sparse data. Children whose parents were deceased exhibited a substantially elevated probability of enuresis (OR= 76.20), though estimates in this group were obtained through Firth correction due to separation. Regarding feeding patterns, bottle-fed children had significantly higher odds (OR= 4.278; 32.78% increase). Living only with the father was also associated with increased likelihood (OR= 41.444), obtained under Firth correction. Nuclear family structure (OR= 1.896; 89.6% increase) and low socioeconomic status (OR= 2.614; 161.4% increase) were significant predictors of higher enuresis risk. In contrast, a longer duration of breastfeeding showed a protective effect: breastfeeding for 0–6 months (OR= 0.215), 7–12 months (OR= 0.244), 13–18 months (OR= 0.273), and 19–24 months (OR= 0.228) corresponded to 78.5%, 75.6%, 72.7%, and 77.2% reductions in the odds of enuresis, respectively (Table 4).

DISCUSSION

In the present study, a significant association was observed between BMI classification and the studied condition, with obesity being more prevalent among cases compared to controls. This finding is consistent with previous studies reported by Weintraub *et al.* [17] in 2013. Their findings indicated that enuresis is more common in obese children than in normal-weight controls. This association may be explained by the presence of comorbid conditions that are commonly seen in obese pediatric patients, such as obstructive sleep apnea and type 2 diabetes mellitus. [18]. Enuresis in obese children may also be underrecognized, emphasizing the necessity of careful assessment to avoid unnecessary psychological distress in this vulnerable group [19]. Family history demonstrated a strong association, where positive parental and sibling history was significantly higher among cases. This result aligns with the established genetic and familial predisposition reported in multiple studies [20–22]. In the current study, feeding history was significantly associated with enuresis, with a higher prevalence observed among bottle-fed children. In contrast, Yanaral *et al.* [19] from Turkey reported a significant association between enuresis and breastfeeding. Previous evidence has highlighted that formula-fed preterm infants score lower on developmental assessments than those who are breastfed [4,23]. In the United States, Barone *et al.* [24] reported that breastfeeding for more than three months was associated with a reduced incidence of enuresis. The discrepancy between our results and those of other studies may be explained by differences in study design, sample size, population characteristics, cultural feeding practices, and duration or exclusivity of breastfeeding. Additionally, recall bias in reporting infant feeding history and variations in controlling for potential confounders such as socioeconomic status, prematurity, or parental education could also account for the differences observed. In this study, children with deceased

parents showed a statistically significant association in cases compared to controls; this could be due to the loss of a parent or poor parental supervision increasing stress-related behaviors, including nocturnal enuresis. The absence of a parent may contribute to inadequate psychological support and inconsistent toilet training routines, which are important for continence development. The child's living status was significantly associated with enuresis, with children living only with the father being more affected. This suggests that the absence of maternal care may play a critical role in the persistence of enuresis, as mothers are often more involved in toilet training and nighttime caregiving routines. By contrast, another study in Iraq by Al-Hussein *et al.* [13] in 2022 reported a statistical significance of enuretic children living with both parents, highlighting that enuresis may still occur despite an intact family structure. This apparent discrepancy could be explained by differences in the underlying mechanisms: while living with only one parent, particularly the father, reflects psychosocial stress and reduced caregiving support, living with both parents does not necessarily protect against enuresis if other risk factors, such as genetic predisposition, low socio-economic status, or obesity, are present. Regarding family size, results in this study indicated that children from extended families had higher rates of enuresis compared to those from nuclear families with the presence of a significant association. However, a previously mentioned study reported a non-significant association between enuretic children living in extended families and their history of breastfeeding [13]. This suggests that while family structure may not influence early infant feeding patterns, it could play a more important role later in childhood by affecting daily routines, supervision, and the psychosocial environment. The difference may also reflect variations in study design, cultural norms, and the parameters examined, whereas our analysis directly linked family size to enuresis; the other study focused on breastfeeding history as the outcome measure. Socio-economic status (SES) was strongly associated in this study, with children from low-SES families being more affected by enuresis. However, the current study is contrasted with the study in Al-Hilla city [13], which found no statistically significant relationship between SES and nocturnal enuresis. The discrepancy may be explained by differences in the way SES was assessed (income level versus educational attainment or occupational class) and the demographic composition of the studied populations. The highest proportion of breastfeeding duration in the current study was 19–24 months, reported by 20 children with enuresis (33.9%) and 30 children in the control group (34.9%). In contrast, a study conducted in Indonesia by Lestarini *et al.* [21] (2020) reported that 52.5% of children were breastfed for ≤ 6 months, while 75.4% were breastfed for more than 6 months; the differences may be attributed to differences in sample characteristics, recall accuracy, and classification of breastfeeding duration, which may

also contribute to the observed discrepancies. In the present study, logistic regression analysis identified several significant predictors of enuresis. Children who were overweight or obese showed markedly increased odds of developing enuresis. A strong familial component was also evident, with second-degree family history showing a significant risk elevation. Children whose parents were both deceased had an extremely high predicted risk. Feeding practices were important determinants: bottle feeding was associated with substantially higher odds, while longer breastfeeding duration demonstrated a consistent protective effect, with reductions in risk ranging from. Living only with the father and low socioeconomic status were likewise significant predictors of enuresis in this population. These findings differ in multiple ways from those reported by Yanaral *et al.* [19]; in this study, BMI did not show a significant association with enuresis, in contrast to the clear risk elevation observed in the current analysis. Moreover, while both studies emphasize the value of family history, Yanaral *et al.* reported a much stronger effect, which may reflect population differences or variations in how family history was categorized. The relationship with breastfeeding also diverged: whereas the current study indicates that longer breastfeeding duration is protective, a comparable study found that breastfeeding was associated with increased odds of enuresis, and family size association disappeared after applying the Firth correction, suggesting that the initial relationship may have been influenced by other variables. Such discrepancies may be explained by methodological differences, variations in sample characteristics, cultural feeding practices, or residual confounding.

Conclusion

Exclusive breastfeeding appears to play a protective role against the development of primary enuresis, while obesity and low socioeconomics increase risk. Enuresis is influenced by interrelated body mass index and socio-environmental determinants.

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Data sharing statement

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

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