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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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PREVALENCE AND ASSOCIATED RISK FACTORS OF NOCTURNAL ENURESIS AMONG CHILDREN AGED 5-18 YEARS IN ALBAHA REGION, SAUDI ARABIA

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Abstract.

Background: Nocturnal enuresis (NE), or involuntary urination during sleep, is a common pediatric condition with multifactorial etiology, including genetic, developmental, and behavioral factors. Despite its high prevalence, it remains underreported and inadequately managed in many settings. This study aimed to assess the prevalence, associated risk factors, and management patterns of nocturnal enuresis among children in a defined population. **Methodology:** A cross-sectional study was conducted among 603 children aged 5 to 18 years. Data were collected using a structured questionnaire completed by parents, covering demographic variables, birth and health history, family background, sleep characteristics, and enuresis-related factors. Statistical analysis was performed to examine the association between nocturnal enuresis and potential risk factors, with a significance level set at $p < 0.05$. **Results:** The mean age of participants was 9.1 years (SD = 3.8), with a male predominance (63.5%). The prevalence of nocturnal enuresis was 35.0%. A significant association was found between enuresis and mode of delivery ($p = 0.027$). Prematurity also showed a significant relationship ($p = 0.007$), with enuresis most prevalent in children born before seven months of gestation (70.6%). No significant associations were observed for gender, birth order, family size, or sleep depth. Among enuretic children, 42.2% experienced bedwetting 2–4 times per week, and 60.2% had primary enuresis. A family history of enuresis was reported in 28.5% of cases, and high fluid intake before bedtime was observed in 64.9%. Although 68.2% of parents had attempted management strategies, only 47.9% reported treatment effectiveness. **Conclusion:** Nocturnal enuresis affects a considerable proportion of children and is associated with factors such as delivery mode and gestational age. Despite its frequency, effective treatment remains underutilized, with many parents reporting limited success. These findings underscore the need for increased awareness, timely intervention, and access to evidence-based management strategies for affected families.

Key words. Nocturnal enuresis, bedwetting, risk factors, children, prevalence, Saudi Arabia, cross-sectional study.

Introduction.

Nocturnal enuresis (NE), defined as involuntary urination during sleep in children over five years of age, is a common childhood condition with significant psychological and social impacts on both children and their families [1]. NE is classified into primary (never achieving continence) and secondary (recurrence after at least six months of dryness) types [2]. This classification aids in guiding clinical assessment and management, as underlying causes and treatment strategies may differ.

Globally, the prevalence of NE varies, with studies reporting rates of 15-25% among children aged 6-12 years [3]. In Saudi Arabia, the prevalence of NE ranges from 18.5% to 48%, with regional variations [4,5]. The wide variation in prevalence can be attributed to differences in diagnostic criteria, cultural attitudes, parental reporting, and study designs [6]. Nevertheless, persistence into adolescence and even adulthood is not uncommon, especially in cases where the condition is not addressed [4].

Risk factors for NE include genetic predisposition, developmental delays, psychological stress, and comorbidities such as urinary tract infections (UTIs) and constipation [7]. Despite its prevalence, many families do not seek medical intervention, relying instead on behavioral modifications or no treatment at all [8]. Socioeconomic status and parental education levels also appear to influence both the prevalence of enuresis and the likelihood of seeking medical care [9]. Despite the burden it places on affected families, a significant proportion of caregivers may underestimate its impact or normalize the condition, resulting in low treatment-seeking behavior and reliance on home-based remedies or behavioral adjustments without clinical guidance [9]. The aim of this study is to determine the prevalence and associated risk factors of nocturnal enuresis among children aged 5-18 years in the Albaha region.

Methodology.

A cross-sectional study was conducted to determine the prevalence and associated risk factors of nocturnal enuresis among children aged 5–18 years in the Albaha area, Saudi Arabia. The main target group was parents or guardians of children within this age group who were also residents of the Albaha region. To ensure uniformity and minimize confounding factors, only children without chronic diseases such as diabetes mellitus, neurological diseases, or structural urological anomalies were included in the study. Individuals with chronic diseases or residing outside the Albaha region were excluded.

The study received ethical approval from the Institutional Review Board of Al-Baha University, Faculty of Medicine (IRB/PEA/BU-FM/2024/188).

The sample size was calculated using a prevalence of 18.5% of nocturnal enuresis reported in previous Saudi studies, at a 95% confidence interval and a 5% error margin. This calculation identified a minimum sample size of 250 participants to yield significant associations. Participants were sampled using

the snowball sampling approach and an internet-based self-administered survey. The questionnaire was distributed through widely used digital platforms such as WhatsApp, and it was also made available in visible public places to improve outreach and completion.

It was constructed based on available literature aligned with the study's objectives. The contents of the questionnaire included several parts: demographic characteristics (age, gender, parental education level, family monthly income), the frequency and wetting pattern of nocturnal enuresis, possible etiological factors including family history, difficulty in arousal from sleep, psychological stress, history of urinary tract infection or constipation, as well as any therapies caregivers had attempted.

The instrument was pretested for clarity and reliability among a subsample of respondents before full administration. The completed questionnaires were encoded and analyzed using the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics were used to summarize the data: frequencies and percentages for categorical variables and means with standard deviations for continuous variables. The chi-square test was used to analyze associations between nocturnal enuresis and categorical risk factors; a p-value of less than 0.05 was considered statistically significant in all analyses.

For respondents who answered 'Yes' to having attempted treatment but did not indicate a specific treatment method, we created a separate category labeled 'Not specified.' These cases were retained in the denominator when calculating the overall proportion of participants who had attempted treatment and when calculating treatment effectiveness. However, they were excluded from method-specific percentage calculations. This approach ensured that all affirmative treatment responses were included in the overall analysis while maintaining accuracy in method-specific reporting.

Results.

The study included a total of 603 children aged between 5 and 18 years, with a mean age of 9.1 years (SD = 3.8). Of the participants, 63.5% were male (n = 383) and 36.5% were female (n = 220). Regarding the child's birth order, 26.5% were firstborn, followed by 20.9% second-born and 19.6% third-born. Most of the children (75.3%) were delivered through normal vaginal delivery. Concerning gestational age, 91.2% of children were born at full term (9 months), whereas 6.0% were born at eight months and 2.8% at less than seven months. Most families had between four and six members (54.1%). Regarding sleep patterns, 64.5% of the children were reported to have deep sleep, whereas 35.5% had light sleep.

As shown in Figure 1, nocturnal enuresis was reported in 35.0% of the children (n = 211), while the remaining 65.0% (n = 392) did not experience involuntary urination during sleep. Analysis of potential risk factors for nocturnal enuresis revealed no statistically significant association with the child's gender (p = 0.051), although enuresis was slightly more prevalent among males (37.9%) compared to females (30.0%). Birth order did not show a significant relationship with nocturnal enuresis (p = 0.219), although second-born children had a slightly higher prevalence (42.9%) compared to other orders. A significant association was found between the mode of delivery and enuresis (p = 0.027), where children born by normal delivery exhibited higher rates of enuresis (37.4%) than those born by cesarean section (27.5%).

Gestational age was also significantly associated with enuresis (p = 0.007), with the highest prevalence observed among children born before seven months (70.6%), suggesting prematurity may be a contributing factor. No significant associations were observed between nocturnal enuresis and the number of family members (p = 0.953) or the child's sleep pattern (p = 0.875) (Table 2).

Among children diagnosed with nocturnal enuresis (n = 211), the most reported frequency of episodes was 2–4 times per week (42.2%), followed by daily occurrences (26.5%). Regarding the timing of enuretic episodes, 46.0% occurred during late hours of sleep, while 42.7% occurred at various

Table 1. *Demographic factors of the children and their families.*

		Count	Column N %
Age of child	**Mean (SD)**	**9.1 (3.8)**	
Gender of child	Male	383	63.5%
	Female	220	36.5%
Child's Order Among Siblings	First	160	26.5%
	Second	126	20.9%
	Third	118	19.6%
	Fourth	100	16.6%
	Fifth or more	99	16.4%
Type of Delivery:	Normal	454	75.3%
	Cesarean	149	24.7%
Number of Pregnancy Months:	Less than 7	17	2.8%
	8	36	6.0%
	9	550	91.2%
Number of Family Members:	3	132	21.9%
	4-6	326	54.1%
	> 6	145	24.0%
Child's Sleep Pattern:	Light	214	35.5%
	Deep	389	64.5%

Table 2. *Risk factors of nocturnal enuresis.*

		Does your child suffer from nocturnal enuresis?				
		No		Yes		P-value
		Count	Row N %	Count	Row N %	
Gender of child	Male	238	62.1%	145	37.9%	0.051
	Female	154	70.0%	66	30.0%	
Child's Order Among Siblings	First	111	69.4%	49	30.6%	0.219
	Second	72	57.1%	54	42.9%	
	Third	74	62.7%	44	37.3%	
	Fourth	68	68.0%	32	32.0%	
	Fifth or more	67	67.7%	32	32.3%	
Type of Delivery:	Normal	284	62.6%	170	37.4%	0.027*
	Cesarean	108	72.5%	41	27.5%	
Number of Pregnancy Months:	Less than 7	5	29.4%	12	70.6%	0.007*
	8	23	63.9%	13	36.1%	
	9	364	66.2%	186	33.8%	
Number of Family Members:	3	87	65.9%	45	34.1%	0.953
	4-6	212	65.0%	114	35.0%	
	> 6	93	64.1%	52	35.9%	
Child's Sleep Pattern:	Light	140	65.4%	74	34.6%	0.875
	Deep	252	64.8%	137	35.2%	

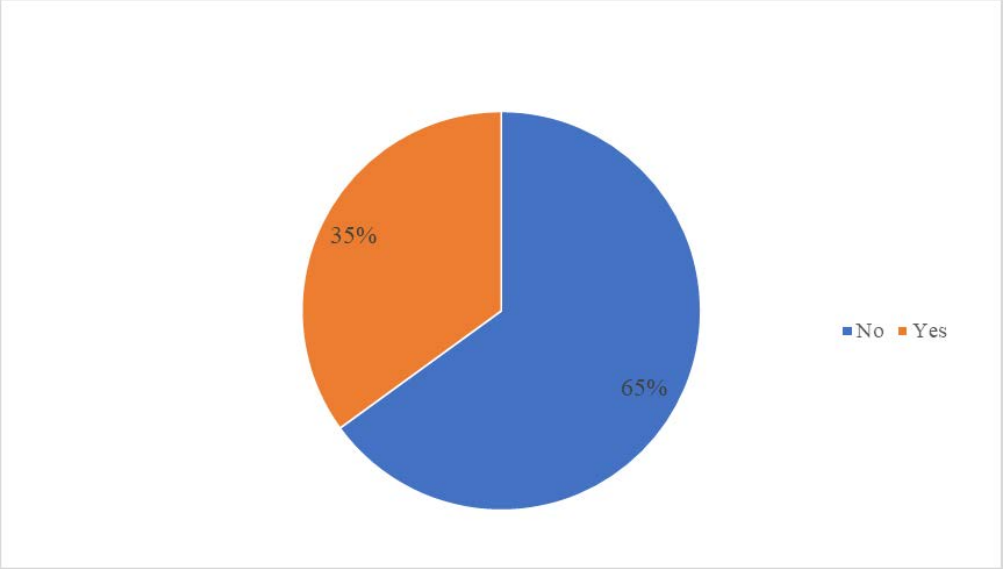

Figure 1. *Does your child suffer from nocturnal enuresis (involuntary urination during sleep)?.*

times throughout the night. Additionally, 19.9% of the children experienced associated daytime urinary incontinence. Most of the cases (60.2%) were identified as primary nocturnal enuresis, with the remaining 39.8% being secondary. Family history revealed that 28.5% of affected children had at least one parent who experienced enuresis during childhood (13.3% maternal, 9.5% paternal, and 5.7% both). Evening fluid intake was high among enuretic children, with 64.9% consuming significant amounts before bedtime. Regarding comorbidities, 11.4% were diagnosed with ADHD, 8.1% with urinary tract conditions, and 6.2% with sleep apnea, while the majority (79.0%) had no other health concerns. In terms of management, 68.2% of parents reported attempting treatment. The most utilized methods included pharmacological therapy (16.9%), behavioral interventions such as fluid restriction and scheduled awakenings (10.4%), enuresis alarms (8.4%), and bladder training exercises (6.5%). However, 65.6 % of pariticipants not specifyed any methods. Among those who pursued treatment, only 47.9% reported positive outcomes, while 52.1% found interventions ineffective (Table 3).

Among the 144 caregivers who reported attempting treatment, 101 (70.1%) did not specify a method. These were coded as 'Not specified' and were included in the denominator for calculating the overall proportion of caregivers who attempted treatment but excluded from method-specific percentage calculations. This ensures that the reported percentages for each treatment type accurately reflect only those who provided method information.

Discussion.

This study identified a prevalence of nocturnal enuresis (NE) of 35% among children aged 5–18 years in the Albaha region of Saudi Arabia. This figure is notably higher than the national

Table 3. *Characteristics of Nocturnal Enuresis.*

		Count	Column N %
Frequency of Nocturnal Enuresis:	Daily	56	26.5%
	2-4 times per week	89	42.2%
	Once a week or less	36	17.1%
	1-2 times monthly	30	14.2%
When does bedwetting occur?	Shortly after sleeping	24	11.4%
	Lately after sleeping	97	46.0%
	At anytime of sleep	90	42.7%
Does your child also suffer from involuntary urination during the day?	No	169	80.1%
	Yes	42	19.9%
Has your child been suffering from nocturnal enuresis since childhood or did it return after a period of control?	Primary	127	60.2%
	Secondary	84	39.8%
Did either parent or a relative suffer from this problem in their childhood?	No	151	71.6%
	Yes, only mother	28	13.3%
	Yes, only father	20	9.5%
	Yes, both parents	12	5.7%
Did any siblings have suffer from this problem?	No	138	65.4%
	Yes	73	34.6%
Does your child consume large amounts of fluids before bedtime?	No	74	35.1%
	Yes	137	64.9%
Does the child suffer from any of the following health conditions?	ADHD	24	11.4%
	Urinary disorders	17	8.1%
	Sleep apnea	13	6.2%
	None	166	79.0%
Have you tried any method to treat the problem?	No	67	31.8%
	Yes	144	68.2%
If the answer is "Yes," which methods have you tried? (Multiple choice)	Behavioral modification (reducing fluids before bedtime, waking the child at night)	16	11.1%
	Enuresis alarm device	13	9%
	Bladder strengthening exercises	10	6.9%
	Medication	26	18.1%
	Not specified	101	70.1%
If you have tried a treatment, was it effective?	No	75	52.1%
	Yes	69	47.9%

average reported in a systematic review and meta-analysis, which found a pooled prevalence of 24.8% across various regions in Saudi Arabia [10] and in a cross-sectional study conducted in Asser region reported a prevalence of 24% [11]. In addition, our prevalence is slightly similar to what reported in another study conducted in Saudi Arabia which reported a prevalence in Riyadh region of 38.7% [4]. The elevated prevalence in Albaha may be attributed to regional variations in socioeconomic status, healthcare access, and cultural perceptions of NE, as similar disparities have been observed in other regions. In addition, the depending on snow-ball sampling technique in collecting the sample which may bias the sample towards parents who are especially concerned about the issues and increase the prevalence of the disorder in the current study.

The study found no significant association between gender and NE prevalence, aligning with previous research in Saudi Arabia [3,10]. This suggests that gender may not be a primary determinant of NE in this context. A significant association was found between preterm birth and increased prevalence of nocturnal enuresis (NE), particularly among children born before seven months of gestation. This finding is consistent with prior literature, which has identified prematurity as a critical risk factor for delayed bladder control [12]. Preterm infants often experience incomplete neurological and physiological development at birth, which may delay the maturation of the central nervous system structures responsible for bladder control, such as the pontine micturition center and spinal reflex arcs [13-15]. These neural circuits play an essential role in the inhibition of involuntary urination during sleep [14].

Moreover, preterm birth is frequently associated with a range of neurodevelopmental delays and complications, including periventricular leukomalacia, intraventricular hemorrhage, and reduced brain volume in regions associated with autonomic regulation [16]. These structural and functional abnormalities may impair the normal circadian release of antidiuretic hormone (ADH), which is essential for reducing urine production during the night [17]. Low nocturnal ADH levels, commonly reported in children with NE, contribute to excessive nighttime urine output and subsequent bedwetting episodes [18,19]. In addition, preterm infants often experience delayed acquisition of toilet training milestones and may present with comorbidities such as attention deficit hyperactivity disorder (ADHD) and sleep

disorders, which have independently been linked to higher NE prevalence [20,21].

This study also demonstrated a significant association between type of delivery and the prevalence of NE. Specifically; children delivered via cesarean section had a lower prevalence of NE compared to those delivered vaginally. This result is somewhat unexpected, as prior studies have shown inconsistent findings. Some studies suggest that cesarean section, particularly when performed electively and without labor, may lead to alterations in neonatal stress responses, microbiota colonization, and immune system development, which could have long-term developmental consequences [22,23]. However, in the context of NE, it is possible that vaginal delivery may be associated with perinatal stress or subtle birth trauma affecting neurological development, especially in cases involving prolonged or complicated labor [24]. These perinatal factors might contribute to impaired bladder control mechanisms later in childhood [24]. However, the current finding that vaginal delivery increased risk of NE in noteworthy, the causative association cannot be established because of cross-sectional nature of the study. Moreover, the absence of information about some maternal factors as maternal age, educational attainment, and socioeconomic position also reduce the importance of this association.

The majority of NE cases in this study were primary, indicating that these children had never achieved sustained nighttime dryness. This aligns with global patterns where primary NE is more prevalent than secondary [2,6]. A notable proportion of children with NE had a family history of the condition, supporting the genetic predisposition theory [25].

Despite the high prevalence of nocturnal enuresis (NE) among children in the current study, it is concerning that only a minority of affected individuals had received effective treatment. This reflects a significant management gap that continues to be documented across different populations worldwide [25]. While some families attempt to address the condition using home-based strategies, a lack of formal medical guidance often leads to suboptimal outcomes. In the present findings, behavioral interventions were the most commonly used management approach; however, a substantial number of parents reported minimal or no improvement, highlighting limited efficacy when such measures are implemented in isolation or without adequate support.

Behavioral interventions, including fluid restriction before bedtime, scheduled nighttime voiding (lifting), and positive reinforcement for dry nights, are widely recommended as first-line treatments for NE [26,27]. These approaches are non-invasive and carry no side effects, making them an attractive starting point [27]. Nevertheless, the success of behavioral strategies largely depends on consistency, parental education, and the child's developmental readiness [27]. In this context, a lack of awareness about proper implementation, coupled with misconceptions about NE being a behavioral issue rather than a medical condition, may reduce adherence and efficacy [27].

Importantly, the underutilization of evidence-based treatments such as enuresis alarms and pharmacotherapy further underscores the need for improved access to care [26]. Enuresis alarms are considered the most effective long-term treatment with a sustained response rate of up to 70%, especially when used under supervision [26]. However, their usage remains low in many settings, often due to cost, lack of availability, or insufficient follow-up [26]. Pharmacological options like desmopressin, a synthetic analog of vasopressin, can also be effective in reducing urine production at night and have been approved for short-term or intermittent use in older children [28]. Yet, this study revealed minimal reliance on such options, suggesting either limited access or inadequate physician-parent communication about available therapies.

Another factor contributing to the treatment gap is the social stigma surrounding bedwetting. Therefore, management should not only target symptom resolution but also address the emotional well-being of affected children through supportive counseling and educational interventions.

To improve outcomes, a multidisciplinary and tiered management approach is recommended. Initial assessment by a pediatrician should include a thorough history, physical examination, and screening for underlying conditions such as urinary tract infections or constipation [26]. Where first-line measures fail, referral to pediatric urology or a continence specialist may be necessary [26]. Additionally, public health strategies aimed at increasing community awareness, destigmatizing the condition, and providing educational resources to caregivers could play a crucial role in encouraging early intervention and improving treatment adherence.

Limitations.

This study is limited by some limitations. This study employed snowball sampling, which significantly limits the ability to achieve a representative sample and is susceptible to selection bias. Responses may be biased towards parents who are especially concerned about the issues examined in this study or towards specific socioeconomic groups with convenient access to internet surveys.

Conclusion.

In conclusion, the study highlights a significant public health concern regarding NE in the Albaha region. The findings suggest the necessity for targeted interventions, including public education and improved access to effective treatments, to address this condition's impact on children and their families.

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