Disruptive Behavioral Disorders among School Children with Primary Monosymptomatic Nocturnal Enuresis at Cairo University Hospitals

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Abstract:

Background: Enuresis is a common presentation among school children. The most common type is primary mono-symptomatic nocturnal enuresis (PMNE). Children suffering from enuresis have at least one psychological or psychiatric problem such as attention deficit hyperactivity disorder (ADHD) and oppositional defiant disorder ODD. **Objective*:*** This study aimed at evaluating the frequency and association between (PMNE) and disruptive behavioral disorders in children and young adolescents. **Methods:** A case-control study conducted at family medicine and child psychiatry clinics at the Center of Social and Preventive care. A total number of 110 children diagnosed with PMNE were assessed for disruptive behavioral disorders using Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS) and Conners Parent Rating Scale-48 items (CPRS-48). Findings were compared with a matched group of 110 children without enuresis. Children and parents were interviewed and diagnosis was confirmed by a child psychiatrist. **Results:** The frequency of disruptive behavioral disorders was higher among cases than controls. The frequencies of ADHD, ODD, and conduct disorder in the case group (57%, 36%, and 30%, respectively) were significantly higher compared to the control group (23%, 11.8%, and 8.2%, respectively). ADHD-I (predominantly inattentive type) showed the highest prevalence among ADHD subtypes (n=31, 28%). The odds of children having ADHD were 4.5 which are significantly higher for children with PMNE than those without PMNE [OR: 4.56, 95% CI (2.54-8.18)]. Comparing cases and controls, the odds ratio for conduct disorder and ODD are [OR: 4.8, 95% CI (2.17-10.65)] and [OR: 4.1, 95% CI (2.04-8.24)], respectively. **Conclusion:** There is a significant association between PMNE and disruptive behavioral disorders in children and young adolescents.

Keywords: Attention deficit hyperactivity disorder, Conduct disorder, Disruptive disorders, Primary mono-symptomatic enuresis

Introduction:

Enuresis is a common pediatric presentation. [(1)] Nocturnal enuresis in children is classified into primary nocturnal enuresis where the child has never been continent and secondary nocturnal enuresis where the incontinence takes place after at least six months of urinary control. Primary mono-symptomatic nocturnal enuresis (PMNE) is the most common subtype of enuresis. [(2)] Many factors have been recognized to cause PMNE including nocturnal polyuria, sleep disturbances, bladder dysfunction, and reduced bladder capacity. [(1)]

There are several known types of behavioral and emotional disorders in children and adolescents including anxiety, disruptive disorders, depression, pervasive developmental disorders, and disruptive

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behavioral problems. The commonest behavioral problems in preschool and school age children include attention deficit hyperactivity disorder (ADHD), conduct disorders or oppositional defiant disorder.[3] A higher risk of emotional instability, behavior problems, and peer-relational problems in children are associated with PMNE.[4]

Out of the children suffering from enuresis, around 20% - 30% have at least one psychological or psychiatric problem as reported by the International Children's Continence Society. This is considered 2-fold higher than those not suffering from enuresis. [5] The common psychiatric co-morbidities include ADHD, followed by ODD, while the least reported co-morbidities include post-traumatic stress disorder, conduct disorder, and bipolar affective disorder. [6]

These co-morbid behavioral disorders can lead to persistence of enuresis and may affect the scholastic achievement and social activities of the children suffering from enuresis. Therefore, comprehensive evidence-based management including proper assessment and treatment should be offered to these children. [4]

In fact, research in this field was scarce in Egypt despite the few studies done which showed high prevalence of nocturnal enuresis among students at primary school. [7] Studies focused on the prevalence and treatment of enuresis and few data related to them were examining the disruptive behavioral problems in enuretic children. The current study aimed to assess the association between PMNE and disruptive behavioral disorders among children and young adolescents.

Methods:

A case-control study conducted at family medicine and child psychiatry clinics in the Center of Social and Preventive care, Cairo, Egypt. The required sample size was 110 subjects diagnosed as PMNE cases (group 1) & 110 age- and sex-matched subjects recruited from the family medicine clinic representing controls (group 2). All subjects were recruited over a period of 6 months. The control group included children who were attending the family medicine clinic, presenting with various acute medical conditions, and do not have enuresis.

Sample size:

The ratio of controls to cases was 1:1, power was 80%, and two-sided confidence level was 95%. The sample size was calculated as 110 cases and 110 controls who were recruited in this study by reference to the percent of controls (2.5%) as well as the percent of cases exposure (12.5%) in a previous similar study. [8]

Inclusion criteria:

For both groups, the included children are those of age range 5-12 years, males and females, and the children whose parents consented for taking part in the study. Included children should not have other psychiatric disorders. For the case group (group 1), the included children had to fulfill DSM IV criteria for primary nocturnal enuresis. Diagnosis was done by a child psychiatrist. For the control group (group 2), obtaining normal sphincter control was a must.

Exclusion criteria:

The children suffering from the following: poly-symptomatic enuresis, secondary or diurnal enuresis, and chronic medical illness as diabetes Mellitus, chronic chest, renal or cardiac condition or epilepsy were excluded. I.Q assessment was done for the case group by using Stanford Binet test. The Arabic version was validated by Melika. [(9)].

Only children with IQ equal or more than 80 were included in the study. Children having other psychiatric disorders such as mood, anxiety, autistic spectrum disorder, and other psychotic disorders were excluded from the study. Assessment was done using the relevant sections of Kiddie Schedule for Affective Disorders and Schizophrenia Present and Lifetime versions (K- SADS-PL). [(10)]

A thorough physical examination was done to exclude Spina bifida, chronic Adenoid hypertrophy, abdominal organomegaly, and other chronic medical illnesses. Urinalysis and culture were done to the case group to exclude urinary tract infection, diabetes mellitus, and diabetes insipidus.

The subjects of the 2 groups were chosen consecutively according to the inclusion and exclusion criteria. The case and control groups were subjected to the following:

I. Relevant socio demographic data, developmental history, medical and family history were assessed using the general section of K- SADS-PL.

II. A semi-structured diagnostic interview was performed with each child and his parents:

1. A standardized child interview was done using the neurodevelopmental, disruptive, and conduct disorders section of K- SADS-PL. The screening interview assessed the primary symptoms of ADHD and disruptive behavior disorders. The scores of most of the items ranged from 0 to 3 points where 0 indicated no available information and 3 represented threshold intensities of symptomatology. [(10)]

Interrater agreement in scoring screens and diagnosis of many psychiatric disorders using K-SADS-PL ranging from 93%-

100% [9]. The Arabic version used in this study was translated and validated by Moussa et al**.** [11]

2. The severity of symptoms was assessed using the 48-item Conner's Parent rating scale (CPRS-48) where parents reported their child's behavior during the past month and were assessed on a 4 point-response scale where 0 represented not true and 3 represented very much true. A score of 66 to 70 represented a possible problem, while a score >75 represented a significant problem. [12]

Many diagnostic efficiency statistics were done for Conner's Parent rating scale and the results were as follows: specificity was 94.5%, sensitivity was 92.3%, positive predictive value was 94.4%, and negative predictive value was 92.5%. The Arabic version used in this study was translated and back translated with the permission of original author and validated by Al-Behairy & Aglaan in 2009. [13]

III. Diagnosis was made by an experienced child and adolescent psychiatrist according to DSM-IV criteria.

Statistical Analysis:

All the data collected from the questionnaires were revised for logical consistency. Pre-coded data was entered into Microsoft Office Excel Software Program. Then, data were coded and entered using the Statistical Package for Social Sciences (SPSS), version 15. For qualitative variables, data were presented using numbers and percent.

Quantitative variables were normally distributed and presented using mean and standard deviation. Comparisons between groups were done using Pearson Chi Square test for qualitative variables and Student t-test for normally distributed-quantitative variables. P value less than or equal 0.05 is considered significant.

Ethical considerations:

Approval of the study proposal was obtained from the research committee at Faculty of Medicine, Cairo University. A written consent was obtained from the parents after explaining the nature of the research.

Results:

Both groups were matched in terms of age and sex. There was no significant difference between both groups regarding the baseline characteristics as shown in Table (1).

ADHD:

As shown in Table (2), there was a statistically significant difference between both groups regarding the frequency of ADHD (p=0.000) where the case group showed higher frequency of ADHD than the control group. The odds of children having ADHD (4.5) were significantly

higher for children with PMNE in comparison to those without PMNE [OR: 4.56, 95% CI (2.54-8.18)].

As shown in Table (3), there was a significant difference regarding ADHD subtypes between both groups (p=0.000). The most frequent subtype is ADHD-predominantly Inattentive type with a percentage of 28.2% (n=31), followed by ADHD-Combined type with a percentage of 25.5% (n=28), while the ADHD-predominantly Hyperactive-impulsive type was the least associated type where it showed higher prevalence in the control group.

Conduct disorder:

As shown in Table (4), we found a significant difference between both groups (p=0.000) where the patients group showed higher frequency of conduct disorder than the control group. The odds of children having conduct disorder (4.8) were significantly higher for children with PMNE in comparison to those without PMNE [OR: 4.8, 95% CI (2.17-10.65)].

Oppositional defiant disorder:

As shown in Table (5), the results in this study showed high statistically significant difference between both groups (p=0.000) where the case group showed higher frequency of ODD than the control group. The odds of children having ODD were 4 times significantly higher for children with PMNE in comparison to those without PMNE [OR: 4.1, 95% CI (2.04-8.24)].

Discussion:

Nocturnal enuresis (NE) is a frequent presentation at the primary health care units. [14] Family physicians should be aware about common co-morbidities related to NE and how to detect them.

A total of 110 children with PMNE were compared to age-and sex-matched control group of 110 children in terms of the presence of disruptive behavior disorders.

Both groups were assessed according to DSM-IV criteria using the Kiddie Schedule for Affective Disorders and Schizophrenia Present and Lifetime version (KSADS-PL) Arabic version. The diagnosis was confirmed by Conner's parent rating scale. We chose KSADS as a probable useful tool that could be used with family physicians; being translated into Arabic language and based on DSM-IV criteria in a simplified way.

A significant difference was found between the case and control groups regarding the presence of disruptive behavior disorders. This highlights the importance of screening for psychiatric disorders in children suffering from enuresis to ensure early detection and appropriate referral of co-morbid cases to a specialist.

The study results showed that the frequency of disruptive behavioral disorders was higher among the group of cases. The percentages of ADHD, oppositional defiant disorder, and conduct disorder in the case group were 57%, 36%, and 30%, respectively; these percentages were significantly higher compared to the control group (23%, 11.8% and 8.2% respectively). This is similar to Amiri et al. who found higher prevalence of psychiatric disorders in 79.23% of children with NE.

The current study results are in hand with Amiri et al 2017 who found that the most common type of disorders was ADHD (74.90%), followed by oppositional defiant disorder (53%), while conduct disorder was the least common disorder.[6]

Also, the results of the present study are in harmony with Birdal & Doğangün who revealed that children with enuresis showed a higher frequency of behavioral problems compared to their peers without enuresis.[15]

This could be explained by the fact that enuresis is multi-factorial with strong genetic elements that may be influenced by many factors such as an immature nervous system.[16]

Another explanation by Van Herzeele & Vande Walle is that the co-existence of disruptive behavioral problems and PMNE can be linked to a common pathway in the central nervous system. The specific role of the central nervous system is still imprecise, but several pathways are possible. [17]

Our study showed that the most common ADHD subtype in children diagnosed with PMNE group was ADHD-predominantly Inattentive type (ADHD-I) with a percentage of 28.2% (n=31), followed by ADHD-Combined type (ADHD-COM) with a percentage of 25.5% (n=28), while the ADHD-predominantly Hyperactive impulsive type (ADHD-HT) was not only the least correlated type, but it also showed higher frequency in the control group.

This result is similar to the result of Okur et al. study who revealed that ADHD-I showed higher frequency among children with PMNE than other subtypes, followed by ADHD-COM.[8] Moreover, our results are in hand with Yousefichaijan et al results who found ADHD inattentive type among 16 cases (16%) and 5 controls (5%) (P = 0.01). [18]

The current study revealed a significant association between PMNE and conduct disorder where the odds ratio was 4.8, 95% CI (2.17-10.65). This is in hand with Park et al study who found that enuresis was significantly associated with conduct disorder (OR 4.7 (95% CI); 1.0-22.4). [19]

Similarly, Hamed et al found a higher prevalence of conduct among children with enuresis. [4] In addition, this study concluded that ODD has a significant

association with PMNE which agrees with the results of Joinson et al **study who** pointed up that the children with nocturnal bedwetting are at increased risk of most of the behavioral problems as oppositional behavior, ADHD, and conduct problems.[20]

Limitation:

The small sample size would limit the generalizability of results. It was difficult to collect the sample of the control group from the same clinic of the case group. Therefore, children who do not have enuresis and attending the family medicine clinic were included. Future studies with higher number of subjects are recommended to increase the statistical power.

Conclusion:

Disruptive behavioral problems are more prevalent among children and young adolescents with PMNE than normal children. ADHD-predominantly inattentive type is the most frequent subtype disorder associated with PMNE. All these results prove the presence of an association between PMNE and behavioral disorders; this could not only prove the higher percentage of comorbidity, but also points at its challenging effect in treatment.

Recommendations for future studies:

There is a strong need to educate parents, especially mothers, the psychiatric disorders among school children. Further research and longitudinal studies would be needed to investigate possible shared factors between PMNE and behavior disorders and study the long-term effects which could result from comorbidity of both and the association between other elimination disorders and behavior disorders. More studies are needed to detect the factors that influence parents of children with enuresis to seek medical advice.

All children with PMNE should be screened for the presence of symptoms of behavior disorders Also, all children with diagnosis of ADHD should be screened for elimination disorders, especially nocturnal enuresis. Family physician's awareness should be raised regarding the genetic role of other siblings in the family where they should be screened for both disorders as well. KSADS could be used by family physicians as screening and diagnostic tool.

Children with enuresis and ADHD should be assessed for academic and behavioural difficulties and offered the appropriate management of children and support for their caregivers.

Conflict of interest: The authors state no conflict of interest.

Funding: Self-funded

Acknowledgment: Special thanks to Cairo University Hospitals for supporting this work. Sincere gratitude to mothers and children who participated in this work.

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Table (1): Baseline characteristics of the case and control groups

Baseline characteristics	**The case group**		**The control group**		***t*-test**	**P value**
Child's age	**Mean ±SD**		**Mean ±SD**		*t*	0.125
	8.7±2.25		9.15±2.17		-1.540	
	The case group					P value
	No. (110)	%	No. (110)	%		
Gender						
▪ Male	63	57.3%	56	50.9%		0.344
▪ Female	47	42.7%	54	49.1%		
Consanguinity						
▪ Positive	37	33.6%	36	32.7%		0.886
▪ Negative	73	66.4%	74	67.3%		
Family history of psychiatric illness						
▪ Present	8	7%	1	1%		0.17
▪ Absent	102	93%	109	99%		
Maternal age at birth						
▪ Less than 20	3	2.7%	6	5.5%		0.278
▪ 20-34 year	84	76.4%	74	67.3%		
▪ More than 34	23	20.9%	30	27.3%		
Parental status						
▪ Married	99	90%	91	83%		0.116
▪ Single parent	11	10%	19	17%		
Motor development						
▪ Normal	102	92.7%	108	98.2%		0.052
▪ Delayed	8	7.3%	2	1.8%		
Language development						
▪ Normal	98	89.1%	107	97.3%		0.16
▪ Delayed	12	10.9%	3	2.7%		

Table (2): Association between PMNE and ADHD (n=220)

ADHD	The case group		The control group		P-value	OR (95% CI) *
	N	%	N	%		
▪ Present	63	57%	25	22%	**0.000**	**4.56 (2.54-8.18)**
▪ Absent	47	43%	85	78%		
▪ Total	110	100%	110	100%		

* OR: Odds Ratio CI: Confidence interval

Table (3): Distribution of ADHD subtypes among case and control groups

ADHD subtype	The case group		The control group		P-value
	No.	%	No.	%	
▪ Inattentive	31	28.2%	7	6.4%	0.000
▪ Hyperactive-impulsive	4	3.6%	11	10%	
▪ Combined	28	25.5%	7	6.4%	
▪ None	47	42.7%	85	77.2%	
▪ Total	110	100%	110	100%	

Table (4): Association between PMNE and conduct disorder (n=220)

Conduct disorder	The case group		The control group		P-value	OR (95% CI) *
	No.	%	No.	%		
▪ Present	33	30%	9	8.2%	0.000	4.8 (2.17-10.65)
▪ Absent	77	70%	101	91.8%		
▪ Total	110	100%	110	100%		

* OR: Odds Ratio CI: Confidence interval

Table (5): Association between PMNE and oppositional defiant disorder (n=220)

Oppositional defiant disorder	The case group		The control group		P-value	OR (95% CI) *
	No.	%	No.	%		
▪ Present	39	36%	13	11.8%	0.000	4.1(2.04-8.24)
▪ Absent	71	64%	97	88.2%		
▪ Total	110	100%	110	100%		

* OR: Odds Ratio CI: Confidence interval

الملخص العربي

الاضطرابات السلوكية التخريبية بين أطفال المدارس المصابين بسلس البول الليلي الأولي أحادي الأعراض في مستشفيات جامعة القاهرة ـ مصر

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الخلفيه: يعد سلس البول أحد أكثر الاعراض شيوعًا بين الاطفال و خاصة سلس البول الليلي الأولي أحادي الأعراض. الأطفال الذين يعانون من سلس البول يعانون من مشاكل نفسيه مثل اضطراب فرط الحركة ونقص الانتباه. الهدف من هذه الدراسة هو تقييم مدي اتباط سلس البول الليلي الأولي أحادي الأعراض والاضطرابات السلوكية التخريبية لدى الأطفال والمراهقين. **طرق البحث والمنهجية:** شملت هذه الدراسة 110 طفل تم تشخيص إصابتهم بـسلس البول الليلي الأولي أحادي الأعراض وتقييمهم من أجل الاضطرابات السلوكية التخريبية وتمت مقارنة هذه النتائج مع مجموعة مطابقة مكونة من 110 طفل لا يعانون من سلس البول. تمت مقابلة الأطفال والآباء وتم تأكيد التشخيص من قبل طبيب امراض نفسية للأطفال. **النتائج:** أظهرت أن الاضطرابات السلوكية التخريبية كانت أعلى بين الحالات. كان اضطراب فرط الحركة ونقص الانتباه ,اضطراب العناد الشارد ، واضطراب السلوك في مجموعة الحالات (57٪ ، 36٪ و 30٪ على التوالي) أعلى بشكل ملحوظ مقارنة بمن لا يعانون من الاضطراب (23٪ ، 11.8 و 8.2٪ على التوالي). أظهر النوع الذي يغلب عليه عدم التركيز أعلى معدل انتشار بين الأنواع الفرعية لفرط الحركه ونقص الانتباه والتي تقدر 31 (28 ٪). احتمالات إصابة الأطفال باضطراب فرط الحركة ونقص الانتباه 4.5 أعلى بين بين المصابين بسلس البول. كما اظهرت النتائج إن احتمالات إصابة الأطفال باضطراب السلوك هي 4.8 مرات أعلى بشكل ملحوظ بين المصابين بسلس البول. احتتمالات إصابة الأطفال باضطراب العناد الشارد 4 مرات أعلى بشكل ملحوظ بين المصابين بسلس البول مقارنة بأولئك الذين لا يعانون. **الخلاصة والأستنتاجات:** يوجد ارتباط بين سلس البول الليلي الأولي أحادي الأعراض والاضطرابات السلوكية التخريبية لدى الأطفال والمراهقين.