

Ya kai Liu<sup>1</sup> Feng Si<sup>2</sup> Song yang Wang<sup>2</sup> Ru Jia<sup>1</sup> Jia Zuo<sup>2</sup> Qing bin Li<sup>2</sup> Mao chuan Fan<sup>2</sup> Hui qing Zhang<sup>2</sup> Jian guo Wen<sup>3</sup>

1. Department of Pediatric Surgery, the First Affiliated Hospital of Xinxiang Medical University, Xinxiang 453100; 2. Department of Urology, the first affiliated Hospital of Xinxiang Medical College, Xinxiang 453100; 3. Henan Joint International Paediatric Urodynamic, The First Affiliated Hospital of Zhengzhou University, Zhengzhou 450052. Corresponding author: Wen Jian guo, Email: wenjg@hotmail.com

## ABSTRACT

Family primary nocturnal enuresis (FPNE), also known as hereditary nocturnal enuresis, means that there have been patients with primary enuresis in their immediate family members now or in the past, and families often have the phenomenon of nocturnal enuresis accumulation, which has a serious impact on the psychology and daily life of children and family members. In recent years, there are few studies on the clinical characteristics, emotional and behavioral problems of enuresis children with positive family history. The purpose of this study is to investigate the clinical characteristics and the effects of emotional and behavioral problems in children with familial aggregation of PNE, providing a reference basis for the treatment of children with FPNE.

## METHODS

A total of 306 children aged 5–16 years with primary nocturnal enuresis who were treated in the nocturnal enuresis clinic of the first affiliated Hospital of Xinxiang Medical College from September 2020 to August 2022 were collected. The inclusion criteria were as follows: (1) the age was 5–16 years old; (2) involuntary urination during sleep was more than once a week for more than 3 months; (3) nocturnal enuresis from childhood and no bed-wetting period for more than 6 months; (4) informed consent and voluntary participation of the family members of the patients. Exclusion criteria: (1) neurological diseases or anatomical malformations of the urinary system; (2) history of urinary surgery; (3) other diseases that may cause secondary nocturnal enuresis, such as diabetes, diabetes insipidus, tethered cord syndrome and so on. Children with PNE were divided into familial primary nocturnal enuresis group (FPNE group, n = 45) and sporadic primary nocturnal enuresis group (SPNE group, n = 261) according to whether three generations of family members were involved or not. The clinical characteristics, emotional and behavioral changes of FPNE group were analyzed. This study was approved by the Medical Ethics Committee of the first affiliated Hospital of Xinxiang Medical College.

## RESULTS

The incidences of severe NE, non-monosymptomatic nocturnal enuresis (NMNE), abnormal stool and nocturnal micturition  $\geq 2$  times in the FPNE group were (68%, 75%, 48% and 42%, respectively) significantly higher than the sporadic enuresis group (SPNE group) (35%, 47%, 24% and 11%, respectively). The number of enuresis children aged 13–16 years old in FPNE group was 44.4% (20/45), which was significantly higher than 19.2% in the SPNE group (50/261) ( $P < 0.05$ ). In the FPNE group, 46.7% (21/45) children were autosomal dominant, 33.3% (15/45) children were autosomal stealth inheritance, and 20.0% (9/45) children showed polygenic inheritance. The total scores of emotional symptoms, hyperactivity symptoms and difficulties in the FPNE group were higher than those in the SPNE group ( $P < 0.05$ ). There was no significant difference in the scores of conduct problems, peer communication and society between the two groups ( $P > 0.05$ ). Multiple linear regression analysis showed that age, poor academic performance and high total score of PSQ were the influencing factors of emotional symptoms in children with FPNE. Poor academic performance, abnormal stool, bladder dysfunction and high total score of PSQ were the influencing factors of hyperactivity symptoms in children with FPNE.

## CONCLUSIONS

The nocturnal enuresis symptom of SPNE group is more serious, and the incidence of bladder dysfunction and abnormal stool is higher. The inheritance mode of FPNE children is mainly autosomal dominant inheritance, followed by chromosome stealth inheritance, and finally polygene inheritance. The incidence of psychological and behavioral abnormalities in children with FPNE is high, and there are many influencing factors. There are many ways of inheritance of FPNE, among which autosomal dominant inheritance is the most common, the incidence of emotional symptoms and hyperactive symptoms is high, and the clinical symptoms are more serious, the risk of frequent and urgent urination is higher, and it is not easy to cure with age.

Table1 Comparison of general data between FPNE group and SPNE group

	FPNE group	SPNE group	Total (n=306)	Z/ $\chi^2$	P value
Sex				$\chi^2=1.131$	P=0.287
male	30 (66.7)	152 (58.2)	182 (59.5)		
female	15 (33.3)	109 (41.8)	124 (40.5)		
Age	12.0(9.0,14.0)	10.0 (7.0,12.0)	10.0 (7.0,12.0)	Z=-4.143	<0.001
Place of residence				$\chi^2=1.412$	P=0.235
urban	15 (33.3)	65 (24.9)	80 (26.1)		
rural	30 (66.7)	196 (75.1)	226 (73.9)		
Character				$\chi^2=0.557$	P=0.456
outgoing	26 (57.8)	166 (63.6)	192 (62.7)		
introverted	19 (42.2)	95 (36.4)	114 (37.3)		
Academic performance				$\chi^2=0.736$	P=0.692
good	19 (42.2)	93 (35.6)	112 (36.6)		
medium	18 (40.0)	114 (43.7)	132 (43.1)		
poor	8 (17.8)	54 (20.7)	62 (20.3)		
Order of severity				$\chi^2=18.069$	<0.001
light	14 (31.1)	169 (64.8)	183 (59.8)		
serious	31 (68.9)	92 (35.2)	123 (40.2)		
Nocturia frequency				$\chi^2=9.616$	<0.01
once	32 (71.1)	231 (88.5)	263 (85.9)		
twice or more	13 (28.9)	30 (11.5)	43 (14.1)		
Accompanying symptom					
constipation	22 (48.9)	63 (24.1)	85 (27.8)	$\chi^2=11.71$	<0.001
functional disorders of bladder	34 (75.6)	123 (47.1)	157 (51.3)	$\chi^2=12.417$	<0.001
Sleep score,	4.0 (2.0,6.0)	4.0 (2.0,6.0)	4.0(2.0,6.0)	Z=-0.721	P=0.471

Table1 showed the Clinical characteristics of family primary nocturnal enuresis, The children in FPNE group are older and more likely to suffer from severe enuresis, bladder dysfunction and constipation.

Table2 Comparison of emotional and behavioral problems between FPNE group and SPNE group

	FPNE group	SPNE group	Total (n=306)	Z	P value
Emotional symptoms	4.0 (2.5,5.0)	3.0 (1.0,4.0)	3.0 (2.0,4.0)	Z=-3.367	P=0.001
Conduct l symptoms	2.0 (1.0,2.0)	2.0 (1.0,3.0)	2.0 (1.0,3.0)	Z=-1.114	P=0.253
Hyperactivity symptoms	5.0 (4.5, 6.0)	4.0 (3.0,5.0)	4.0 (3.0,5.0)	Z=-5.877	P<0.001
Peer communication	2.0 (2.0,4.0)	3.0 (2.0,4.0)	3.0 (2.0,4.0)	Z=-0.390	P=0.697
Social behavior	8.0 (7.0, 9.0)	8.0 (7.0, 10.0)	8.0 (7.0,9.0)	Z=-1.766	P=0.077
Difficulty score	22.0 (18.5, 23.0)	19.0 (17.0,22.0)	20.0 (17.0,22.0)	Z=-3.194	P=0.001

Table2 showed the emotional and behavioral problems between FPNE group. The children in FPNE group had higher psychological and behavioral problems, and the total scores of emotional symptoms, hyperactivity symptoms and difficulties in FPNE group were higher than those in SPNE group.

Table3 Multiple linear regression of emotional symptoms in children with FPNE

	B value	SE	SRC	t	P value
Age	0.165	0.068	0.284	2.422	0.021
Sex	-0.099	0.431	-0.027	-0.228	0.821
Character	0.380	0.410	0.106	0.927	0.360
Place of residence	-0.095	0.427	-0.026	-0.222	0.826
Academic performance	1.423	0.571	0.367	2.490	0.018
Order of severity	-0.261	0.453	-0.070	-0.575	0.569
Constipation	0.019	0.469	0.006	0.040	0.968
Functional disorders of bladder	0.303	0.494	0.076	0.613	0.544
PSQI score	0.280	0.094	0.424	2.975	0.005

Table4 Multiple linear regression of hyperactivity symptoms in children with FPNE

	B value	SE	SRC	t	P value
Age	0.005	0.044	0.011	0.106	0.916
Sex	0.026	0.280	0.010	0.092	0.927
Character	-0.030	0.266	-0.011	-0.111	0.912
Place of residence	-0.292	0.277	-0.108	-1.053	0.300
Academic performance	0.907	0.371	0.315	2.444	0.020
Order of severity	0.283	0.294	0.103	0.960	0.344
Constipation	0.641	0.304	0.251	2.105	0.043
Functional disorders of bladder	-0.712	0.321	-0.240	-2.220	0.033
PSQI score	0.133	0.061	0.270	2.168	0.037

Table3, 4 showed that Multiple regression Analysis of related factors of emotional and Behavioral problems in FPNE Children. Older children with enuresis, poor academic performance and high total score of PSQ are the risk factors of emotional symptoms in children with FPNE. Poor academic performance, abnormal stool, bladder dysfunction and high total score of PSQ are the risk factors of hyperactivity symptoms in children with FPNE.