

Research Article

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Assessment of Blood Pressure in Primary Monosymptomatic Nocturnal Enuresis

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Introduction

Enuresis is a multifactorial problem. Since both urine and blood pressure are controlled by the autonomic system, enuresis may be associated with blood pressure problems [1-3].

Introduction: Enuresis is defined as the repeated voiding of urine into bed at least twice a week for at least 3 consecutive months in a child who is at least 5 years of age. Primary enuresis occurs in children who have never been consistently dry through the night. Monosymptomatic enuresis has no associated daytime symptoms. Increased nocturnal urine production in primary nocturnal enuretic patients could possibly be associated with autonomic nervous system dysfunction. The aim of this study was to investigate autonomic nervous system function in enuretic children.

Materials and Methods: In this study, children with monosymptomatic primary nocturnal enuresis (MPNE) and healthy children without MPNE were enrolled and their blood pressure was measured twice a day (in the morning and afternoon). Urinalysis, urine electrolyte levels, urinary culture, and urinary system ultrasound were performed in all the children. They were also requested to have a diary about daily fluid intake and the volume of daily urine.

Results: The MPNE group comprised 100 children (M/F: 58/42) and the control group included 100 healthy children (M/F: 51/49). The mean age of the children was 8.1 ± 2.3 and (8.9 ± 2.53) years in MPNE and control groups, respectively. The mean diastolic blood pressure (DBP) during the nighttime and daytime did not differ between the groups (p -value >0.05); however, the mean systolic blood pressure (SBP) was significantly higher in the nighttime in the MPNE group (p -value <0.05) but did not differ between the groups during the daytime (p -value >0.05).

Conclusions: Nighttime SBP was significantly higher in children with MPNE. These subtle abnormalities of the circadian blood pressure regulation may reflect autonomic nervous system dysfunction and contribute to the pathogenesis of MPNE.

Keywords: Child; Enuresis; Blood pressure; Autonomic dysfunction

Running Title: Blood Pressure in Nocturnal Enuresis

Some case reports have indicated that enuresis is associated with blood pressure [4,5].

Increased nocturnal urine production and/or bladder hyperactivity in patients with primary

nocturnal enuresis (NE) could possibly be associated with autonomic nervous system dysfunction. Reports of studies on autonomic nervous system dysfunction in NE are limited.

Materials and Methods

Enuresis is defined as the repeated voiding of urine into bed at least twice a week for at least 3 consecutive months in a child who is at least 5 years of age. Primary enuresis occurs in children who have never been consistently dry through the night; monosymptomatic enuresis has no associated daytime symptoms [6-10].

An average of three measurements was recorded to the nearest 0.1 cm. In this study, a mercury sphygmomanometer with a cuff that covered approximately two thirds of the upper part of the arm was used for blood pressure measurement. The duration of this study was one year.

The two groups had no sleeping disorders and individuals with sleep disorders were excluded from the study.

In this case- control study, we selected 100 children (age range: 5 to 12 years) with MPNE based on the DSM IV criteria as cases and 100 children without MPNE as controls who were all hospitalized in Amir-Kabir Hospital, Arak/Iran. The simple non-probability method was used for sample selection. Our exclusion criteria were 1) children with known underlying kidney and other organ diseases, 2) children with psychological or nervous system disorders, 3) children whose parents did not cooperate fully. The control group was selected from among pediatric patients with other complaints like common cold considering the exclusion criteria. After primary evaluation regarding exclusion/inclusion criteria, basic information (age, sex, etc.) was recorded. Consent was obtained from parents or legal guardians. The study was conducted according to ethic policies and the Declaration of Helsinki. The study protocol was approved by the Ethics Committee of the University.

Standard procedures for the measurement of blood pressure were used in each child. Three blood pressure measurements were obtained by trained personnel on the right arm in the sitting position using standard mercury sphygmomanometers with appropriate cuff sizes. Blood pressure was measured three times a day (10 am, 4 pm, and 8 pm). Blood pressure measurements were performed with the CITIZEN REF CH_311B.

Systolic BP was documented at the first appearance of a pulse sound (korotkoff phase 1) and diastolic BP at the disappearances of the pulse sound (Korotkoff phase 5). We used the average of the three measurements from each subject for analysis. Pre-hypertension was defined as resting systolic and /or diastolic BP values between the 90th and 95th percentiles and as hypertension if the readings were equal to or exceeded the 95th percentile according to gender, age, and height [11]. The standing height was measured with the shoes removed and the child facing away from the wall with the heels, buttocks [12], shoulders, and head touching the wall and the child looking ahead and the external auditory meatus and lower margin of the orbit aligned horizontally. An appropriate sized cuff has an inflatable bladder that is at least 40% of the arm circumference at a point midway along the upper arm. The inflatable bladder should cover at least two thirds of the upper arm length and 80%-100% of its circumference. The results were analyzed using the SPSS using descriptive tests for basic information and Chi-square for qualitative variables. P-values less than 0.05 were considered significant in our comparisons. This study was approved by the Ethics Committee of Arak University of Medical Sciences. The study was conducted in accordance with the Declaration of Helsinki and a written consent was obtained from all participants. The participants were free to exit the study if they wished to.

Results

Overall, 200 children (100 cases and 100 controls) were selected for our study. Demographic, clinical and paraclinical of study groups are shown in table 1. The nighttime DBP in 4 children with MPNE and in 3 children in the control group was 90-95% (p-value=0.4). The DBP of 9 children with MPNE during the daytime and 6 children in the control group was 90-95% (p-value=0.6). The nighttime and daytime DBP did not differ between the two groups. The nighttime SBP was between 90-95% in 41 children in the MPNE group and 6 children in the control group (p-value=0.0002). The daytime SBP was between 90-95% in 11 children with MPNE and 14 controls (p-value=0.2). SBP was significantly higher during the nighttime in children with enuresis. These abnormalities of blood pressure regulation may reflect autonomic nervous system dysfunction and the pathogenesis of MPNE.

Discussion

Because this study was not done in the past, were found no relevant articles in the literature for comparison.

Nocturnal enuresis is more common in boys than girls which was also the case in our patient group in which there was an overrepresentation of the male gender among enuretic children. Normally, the nocturnal decrease in urine production is accompanied by decreased BP during the sleep [13]. In otherwise healthy adolescents who are sleep deprived, the nocturnal decrease in BP is less pronounced and nocturnal urine production is remarkably increased.

Table 1. Clinical and paraclinical data of study groups.

	Control	Case	p-value
Age	8±3	9±2	0.5
Gender	36%f 64%m	41%f 59%m	0.35
Height(cm)	131±4	142±3	0.44
Weight(kg)	26±3	29±2	0.31
Report of sonography	Normal	Normal	
Severity of enuresis	without enuresis	15 times per month	
BP in morning	99%normal 1%preHTN 0%HTN	98%normal 2%preHTN 0%HTN	
BP in evening	97%normal 3%preHTN 0%HTN	79%normal 21%preHTN 0%HTN	
BP in night	98%normal 2%preHTN 0%HTN	68%normal 29%preHTN 3%HTN	

The nocturnal decrease in BP in normal subjects has been reported to be about 10% of the daytime values. None of the patients included in our study were hypertensive according to age and height percentile values, but the nocturnal SBP and DBP values of these patients were higher compared to controls. The results we obtained are compatible with those reported in similar published studies, and support the notion that the regulating mechanisms of the circadian rhythm of BP may play a role in the pathophysiology of nocturnal enuresis. Based on the data, we propose that enuretic children have a higher nocturnal BP compared to non-enuretic and thus the BP is an effective factor in the occurrence of enuresis in these children.

Limitation of this study:

Some people did not return to the clinic for blood pressure measurement.

Conclusions

In summary, nocturnal systolic and diastolic BP levels were observed to be significantly higher in enuretic patients compared to controls. Thus, based on our findings, it can be concluded that a disorder in the circadian rhythm of BP may play a role in the pathophysiology of nocturnal enuresis. Further studies will be necessary to clarify the causative relationship between hypertension and nocturnal enuresis in children.

Acknowledgement

The project was approved in January 2014 (Ethic code registration number= 888).

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Conflict of Interest

Authors have no conflict of interest to declare.

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None declared

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