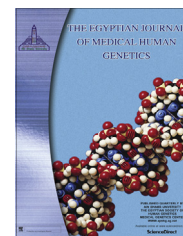




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ORIGINAL ARTICLE

A prospective longitudinal study to estimate the prevalence of obesity in Egyptian children with nocturnal enuresis and the association between body mass index and response to therapy

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KEYWORDS

Behavioral problems;
Enuresis;
Epidemiology;
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Abstract Purpose: Nocturnal enuresis is defined as the involuntary voiding of urine in bed beyond the age at which bladder control is normally obtained. Previous studies have suggested a high rate of obesity in children with nocturnal enuresis. We evaluated this hypothesis and investigated the correlation between body mass index and the efficacy of treatment.

Subjects and methods: This was a prospective–longitudinal study done on 180 children with primary mono symptomatic nocturnal enuresis. Urinary diary data and body mass index percentile were determined. Response to the treatment was evaluated statistically and correlated with body mass index percentile. Response to different modalities of the treatment were also statistically evaluated separately and correlated with the BMI. The statistical test used was ANOVA *F*-test.

Results: 22.7% of our patients with nocturnal enuresis were either overweight or obese (13.9% and 7.8% respectively) according to the Egyptian national growth charts. Therefore, the prevalence of overweight and obesity is not higher in children with nocturnal enuresis as compared to the overall prevalence in normal Egyptian children (14%). But when we adjusted these values according to the social class of our patients, the prevalence of obesity was higher than normal for children of low socioeconomic status.

There was no significant correlation between response to standard pediatric urological interventions (behavioral therapy, alarm therapy, imipramine, desmopressin, oxybutynin and tolterodine) and the BMI of our patients. Also, there was no significant difference in the response or relapse rates to the different modalities of therapies in the groups of patients with different BMI.

Conclusions: Obesity correlates with high BMI in lower socioeconomic classes, but does not correlate with efficacy of the treatment in children with nocturnal enuresis.

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1. Introduction

Primary mono symptomatic nocturnal enuresis (PMNE) is one of the most common developmental problems in children which affects up to 20% of children at five years of age and nearly 1% of young adults [1]. It is defined as involuntary urination while asleep after the age at which bladder control usually occurs [2]. Mono symptomatic enuresis is defined as enuresis in children without any other urinary tract symptoms and without a history of bladder dysfunction [2].

Obesity is increasing at an alarming rate throughout the world. Obesity is a condition of excess body fat often associated with a large number of debilitating and life-threatening disorders. Obese children are at a higher risk for asthma and obstructive sleep apnea during childhood, as well as hypertension, diabetes, cardiovascular disease, gall bladder disease and osteoarthritis in adulthood [3,4]. Overweight children have an increased risk of being overweight as adults [3].

A good understanding of the association between obesity and socioeconomic status (SES) has many important public health and policy implications. In the developed countries there is a strong inverse relationship between obesity and SES. While in the developing societies a strong direct relationship exists between SES and obesity among men, women and children [5].

Previous studies suggested a high rate of obesity in children with various forms of dysfunctional voiding, especially nocturnal enuresis [6]. However, there are few data regarding whether obese children with nocturnal enuresis are more or less likely to respond to the treatment. In a study done by Ahmet et al. [7] a better response to the standard treatment in patients with a BMI below the 85th percentile was seen. They speculated that the lower success rates for the treatment in patients with high BMI suggest not only that there is an association, but also that obesity and incontinence may well share a common etiology.

In the current study, we investigated the prevalence of obesity among Egyptian children with primary mono symptomatic nocturnal enuresis. And we investigated the correlation between BMI and efficacy of the treatment. We also correlated the BMI to the response and relapse rates of the different standard pediatric urological interventions used for the treatment of enuresis in an attempt to identify the best modality of therapy that can be used for the treatment of obese or overweight enuretic children in Egypt.

2. Patients and methods

This was a prospective–longitudinal study. We evaluated 400 children (age ranges from 5–16 years) chosen randomly from our Child and Adolescence Psychiatry Clinic, Children Hospital, Ain Shams University who had a diagnosis of primary mono symptomatic nocturnal enuresis (PMNE) according to the Standardization Committee of the International Children's Contenance Society [2] in the period between July 2012 and July 2014.

One hundred and eighty patients met our criteria. Eligible patients had significant nocturnal enuresis (non diurnal) without any other urinary tract symptoms and without a history of bladder dysfunction with wetting frequency of 3 or more nights per week, for at least 2 weeks of observation.

Patients with one or more of the following were excluded from the study; diurnal enuresis, urinary tract infection, polyuric disorders (diabetes mellitus or diabetes insipidus), abnormal urine analysis, urinary tract abnormality, significant hydronephrosis or reflux, history of renal disease, hypertension or genitourinary abnormality, neurological disease, mental retardation or psychological disease. Those with secondary enuresis were, also, excluded (i.e. children who develop enuresis after a dry period of six months or more [2]).

3. Methodology

Each patient in this study was subjected to the following; Full *history* was taken from all patients, including; demographic data, presence of organic or psychological diseases, family history of similar cases, and previous treatment for enuresis which was received. Also assessment of the socioeconomic status of the patients was done.

Clinical examination including; body measurements, physical examination and neurological examination.

Weight (Wt): The body weight was measured using Seca scale and recorded to the nearest 0.1 kg. The measures were converted into percentiles and were entered separately to the Egyptian growth charts for age and sex [8].

Height (Ht): The standing height was measured using stadiometer to the nearest centimeter. The measures were converted into percentiles and were entered separately to the Egyptian growth charts for age and sex [8].

Body Mass Index (BMI): Body mass index was calculated as weight in kilograms divided by the square of height in meters ($Wt (kg)/Ht (m^2)$). Then, it was plotted by age on a gender specific Egyptian growth chart [8] to determine the child's category, which may be one of the following four categories [9]:

- Normal weight: between the 5th and the 85th percentiles.
- Overweight: between the 85th and 95th percentiles.
- Obese: higher than 95th percentile.
- Underweight: less than 5th percentile.

Investigations: Urine analysis (for all cases): To exclude presence of pyuria, glucosuria and diabetes insipidus.

Scales: The *Stanford-Binet Intelligence scale* [10] was used for all the participating children to determine intelligence quotient or IQ which is simply the ratio of mental age (MA) to chronological age (CA) multiplied by 100 ($IQ = MA/CA \times 100$). The Stanford–Binet Intelligence Scale consists of 15 subsets. The subsets are grouped into 4 broad areas verbal reasoning, abstract/visual reasoning, quantitative reasoning and short term memory and a composite score is derived from the area scores.

The Socioeconomic Status Scale for health research in Egypt-the new version [11] was performed for all patients and their families. This scale was developed and validated by Fahmy and El-Sherbini [12] and updated and re-validated in 2012. The new socioeconomic status scale has 7 domains (education and culture, occupation, family, family possessions, economic, home sanitation and health care) with a total score of 84, with a higher score indicating better SES. Socioeconomic level is classified into very low, low, middle and high levels depending on the quartiles of the score calculated.

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