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Evaluation of lower urinary tract dysfunction in Turkish primary schoolchildren: An epidemiological study

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Received 29 January 2014; accepted 7 May 2014

Available online 20 June 2014

KEYWORDS

Lower urinary tract dysfunction;
Childhood;
Prevalence

Abstract *Objective:* The aim was to determine the prevalence of voiding dysfunction and its related risk factors in Turkish schoolchildren.

Materials and methods: A randomly selected, cross-sectional study was conducted using a self-administered and previously validated questionnaire. The questionnaire consisted of two parts. The first part included personal demographic and familial information, and the second part included the Dysfunctional Voiding and Incontinence Scoring System (DVISS). The questionnaires were given to 4668 children between 6 and 15 years of age, which were completed by the parents and children together. The children with a score of ≥ 9 were accepted as having lower urinary tract dysfunction (LUTD).

Results: The data were collected from 4016 children (the response rate was 86.0%), including 48.6% boys and 51.4% girls. The mean age was 10.5 ± 2.2 years. The overall frequency of LUTD was 9.3%. While the 6-year-old children had the highest frequency (23.1%) of LUTD, this rate was 7.9% at the age of 10, and the children aged 14 years had the lowest frequency (4.9%), ($p < 0.001$). Lower urinary tract symptoms were significantly more common in girls (7.6%) than in boys (3.2%) only for the older age group (between 12 and 15 years of age). Compared with normal children, those with LUTD (with a score of ≥ 9) had the following risk factors: less educated parents, a parent that had lower urinary tract symptoms when he or she was a child, more persons per room (≥ 2 persons), more siblings (≥ 4 siblings) at home, past medical history of urinary tract infections, and squatting position (in girls).

Conclusions: Lower urinary tract problems are one of the most important and ongoing health problems in childhood. Determining the prevalence of lower urinary tract problems in children

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and their related risk factors is the first step to managing and reducing the number of children suffering from voiding problems.

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Introduction

Lower urinary tract dysfunction (LUTD) is a common cause of referral to pediatricians, pediatric nephrologists, and urologists. This problem can lead to poor self-esteem, family stress, and social isolation in most children. In addition, they have a higher rate of parent-reported psychological problems than children without LUTD [1]. Although lower urinary tract symptoms (LUTS), appear to have a peak incidence between the ages of 5 and 7 years, the majority of children with LUTS are primary school-aged children [2]. Moreover, children with LUTS, such as urgency and bladder-holding maneuvers, may develop recurrent urinary tract infections (UTIs) or persistent vesicoureteral reflux and carry an increased risk of upper urinary tract damage [3].

The diagnosis of LUTD and the examination of these children include both non-invasive (urinalysis, questionnaires, uroflowmetry, and post-voiding residual urine assessment) and invasive (urodynamic studies) tests [4]. However, in the majority of cases, non-invasive tools are sufficient for diagnosis. In recent years, well-designed and validated questionnaires have been developed to confirm diagnoses of lower urinary tract dysfunction, classify their severity, and serve as a monitoring instrument to determine response to treatment [5,6]. Meanwhile, these questionnaires can easily be used for epidemiological studies into the prevalence of LUTD in the community. To date, although large epidemiological studies to estimate and predict worldwide and regional prevalence of LUTD in adults and children, very limited data for Turkish children have been reported [7,8].

The aim of this study was to evaluate the prevalence of LUTD in Turkish elementary schoolchildren with a previously validated questionnaire, and to identify personal or familial risk factors.

Materials and methods

We conducted a randomly selected, cross-sectional study using a self-administered and previously validated questionnaire that was developed by Akbal et al. [6] in 20 elementary schools from December 2011 to January 2013. The children and their parents were not informed about normal voiding and urinary tract dysfunction before the study. Parental consent and permission from the local ethics committee and *City Directorate of National Education* were obtained. The questionnaires were given to 4668 children who were between 6 and 15 years of age (first- to eighth-grade students), which were to be completed by the parents and children together, and collected after 7 days.

The questionnaire consisted of two parts. The first part included demographic information, such as age, gender,

school localization (rural or urban), ages of the parents, parents' education, family income, number of siblings, number of people living at home, type of toilet (seat or squat), history of UTIs, and family history of LUTS (Appendix 1). The second part of the questionnaire included the DVISS, which was developed for Turkish children by Akbal et al. (Appendix 2) [6] and validated by Dogan et al. [4]. We have only added a picture of the holding maneuver for a better understanding of the 11th question. According to this questionnaire, which has 90% sensitivity and specificity, children with a score of 9 or greater were accepted as having LUTD.

We used the Statistical Package for Social Sciences (SPSS) 17.0 for Windows to perform statistical analysis. The means are given as mean \pm standard deviation. According to the symptom score, the children were divided into two groups on the basis of the categorical variables of children with and without LUTD. All personal and familial parameters were evaluated for significant risk factors associated with LUTD using chi-square tests. A p -value < 0.05 was considered to be statistically significant.

Results

The data were collected from 4016 children (a response rate of 86.0%), which included 1927 boys (48.6%) and 2035 girls (51.4%); 54 children did not report their gender. The mean age was 10.5 ± 2.2 years.

According to the data for the 3892 children who had filled out the second part of the (DVISS) questionnaires completely, the prevalence of LUTD was 9.3% (363/3892). While the children aged 6 years had the highest frequency (23.1%) of LUTD, this rate was 7.9% at the age of 10; children aged 14 years had the lowest frequency (4.9%) ($p < 0.001$). The frequency of LUTD decreased with age (Fig. 1). There was no statistically significant gender difference in terms of LUTS frequency (9.8% in girls vs. 8.6% in boys, $p = 0.18$) in all children. However, when the participants were divided into two groups as younger (6–11 year of age) and older (12–15 year of age) children, the frequency of voiding dysfunction in girls was significantly higher than in boys (7.6% vs. 3.2%, $p = 0.001$) in the older age group (Fig. 1).

According to the demographic data, there was no significant relationship between LUTD and the following parameters: residential area (urban or rural), presence or lack of family health insurance, total number of people living at home, death of one of the parents, and family income. However, the associations of LUTD with the number of persons per room (≥ 2 persons) and the number of siblings (≥ 4 siblings) were statistically significant (Table 1). We found that children from families with more educated parents had significantly less LUTD (Table 1). There was no

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