Austin Journal of Urology

Open Access

Austin Publishing Group

Research Article

Evaluation of Asymptomatic Bacteriuria and Pyuria in Diabetic Children Referred to Children's Medical Center in 2017-2016

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Received: February 01, 2018; **Accepted:** May 10, 2018; **Published:** May 21, 2018

Abstract

Objectives: The rate of diabetes is increasing among children lately. Studies show that the rate of asymptomatic bacteriuria and pyuria are higher among diabetic children than non-diabetics. The aim of this study was to evaluate asymptomatic bacteriuria and pyuria among diabetic children.

Methods: Between 2015- 2016, one hundred and twelve (112) diabetic children aged15 years and below that were referred to Children's Medical Center hospital in Tehran were included in this study. Participants filled a questionnaire form which sought to take their biographic data, current FBS and HbA1C levels. Their blood and urine samples were taken and tested for FBS, HbA1C, Urine Culture (U/C), and Urine Analysis (U/A).

Results: The mean FBS and HbA1C were 278.02±139.04 mg/dL and 10.24%, respectively. The present study showed that 12 (10.7%) participants have positive urine culture result (≥ 105 cfu/ml), and 10 (83.3%) out of this population were females, with 2 (16.7%) being males. Additionally, pyuria and asymptomatic bacteriuria were seen in 15 (13.4%) and 41 (36.4%) participants, respectively.

Conclusion: Based on the results of this study, bacteriuria especially ASB and pyuria are more prevalent among diabetic children. The study shows 10.7% of participants had positive urine culture, indicating the presence of UTI. However, they did not show any significant signs and symptoms, suggesting ASB. In addition, occurrences were more frequent among females than males. Regular screening for pyuria and asymptomatic bacteriuria in diabetic children could help diagnose and prevent urinary tract infections.

Keywords: Asymptomatic bacteriuria; Pyuria; Diabetic children; Urinary tract infection

Introduction

Bacteriuria is the presence of bacteria in urine. A positive urine culture ($\geq 10^5$ cfu/ml) is a confirmatory test but must be detected in two consecutive specimens [1]. Bacteriuria could present as symptomatic or asymptomatic. In Asymptomatic Bacteriuria (ASB), the symptoms of urinary tract infection (dysuria, frequent urination, fever) are absent. Asymptomatic bacteriuria is most prevalent among females, especially during pregnancy, the aged, in neurogenic bladder diseases, during hemodialysis, and among patients with urinary catheters [2]. Asymptomatic bacteriuria is reported higher in developing countries than developed countries [3,4].

A study by Salem, M., et al. shows that the prevalence of ASB in diabetic children is higher than it is in nondiabetics [5] and the prevalence of ASB in children was found to be 6% [6]. Furthermore, urinary tract infections occur more often in diabetic patients than nondiabetic individuals [7]. Urinary Tract Infection (UTI) is a common bacterial infection with accessible treatment [8] and often accompanied by bacteriuria and pyuria. Pyuria is a term used to describe the presence of 10 or more white blood cells (WBC/mL) in urine samples [9].

The most important known risk factor of ASB, is diabetes mellitus [10]. Diabetes refers to a group of chronic metabolic diseases which is classified by ADA (American Diabetes Association) as Type 1 or type 2. Other specific types are gestational diabetes, diabetes LADA, diabetes insipidus and juvenile diabetes [11]. Type 1 diabetes (also called insulin-dependent) is basically an autoimmune disease, causing damage to the beta cells of pancreatic islets of Langerhans which produce insulin. This damage occurs faster in children than in adults. It could also result from multiple genetic predispositions and non-genetic factors which haven't been defined clearly [12]. The prevalence of type 1 diabetes varies based on demographics. In Europe, the highest and the lowest rates of type 1 diabetes were reported from Finland and Balkan respectively [12,13]. The prevalence of type 1 diabetes is increasing rapidly worldwide, and its related risk factors are becoming issues of concern [14,15]. The IDF (International Diabetes Federation) estimates there will be 592 million diabetic patients by 2035 in the world [16].

The prevalence of diabetes type 2 is increasing among children

Citation: Abdolrahim Poor Heravi S, Abdollahzadeh M, Jawula Salisu W, Rahimkhani M and Ali Taheri. Evaluation of Asymptomatic Bacteriuria and Pyuria in Diabetic Children Referred to Children's Medical Center in 2017-2016. Austin J Urol. 2018; 5(1): 1060.

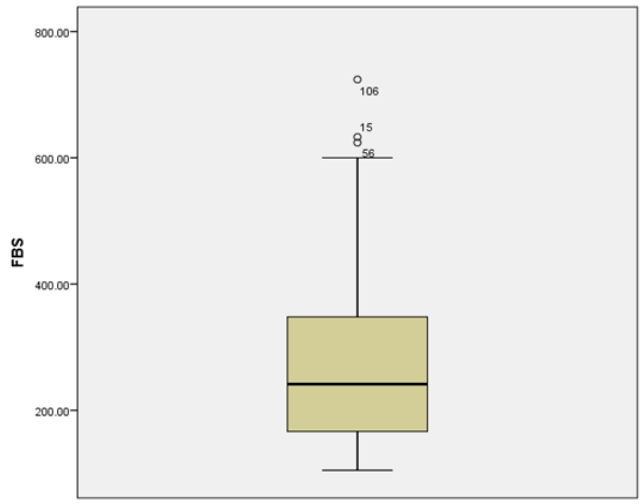

Figure 1: Description of FBS prevalence among diabetic children that were referred to children's medical center 2016-2017.

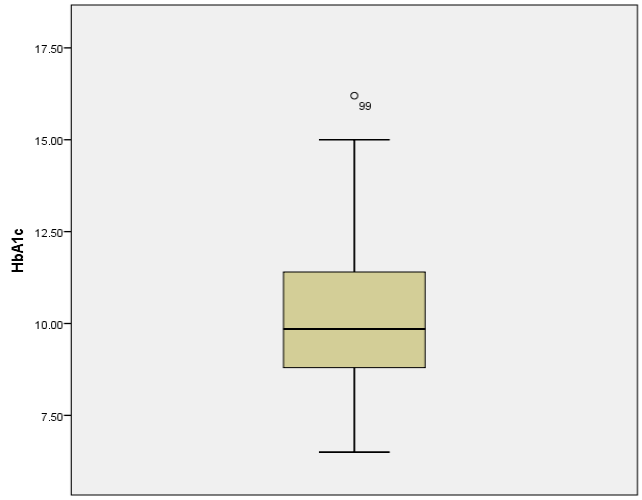

Figure 2: Description of HbA1C prevalence among diabetic children that were referred to children's medical center in 2016-2017.

[17], and often characterized by insulin resistance and impaired glucose-stimulated insulin secretion [18,19]. It is estimated that by 2040, the prevalence of type 2 diabetes will be 642 million globally [20].

The present study was to determine the prevalence of asymptomatic bacteriuria and pyuria in diabetic children and to provide statistical records according to the findings, in order to understand if there is any relation between both factors. With this, we could compare results of other countries to arrive at suitable solutions for the timely diagnosis and initiation of effective measures in reducing the numerous problems patients face.

Materials and Methods

Inclusion criteria: Between 2015 and 2016, 112 diabetic children aged 15 years and below that had been referred to Children's Medical Center Hospital in Tehran were included in this study to evaluate

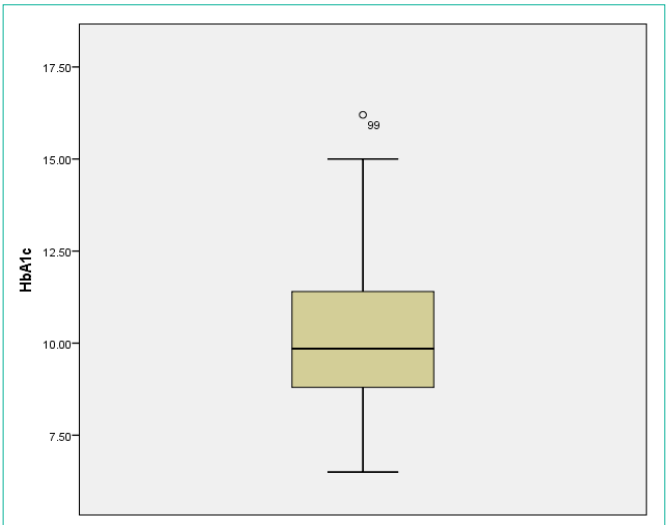

Figure 3: Description of distribution of the bacteria in urine samples among diabetic children that were referred to children's medical center 2016-2017. (1= non, 2= few, 3=moderate, 4=severe)

their ASB and Pyuria. Diabetic children with FBS higher than 110 mg/dL and with 6% or higher hemoglobin A1c (HbA1C) were also included

Exclusion criteria

Non diabetic children were excluded from the study. Participants filled a questionnaire form which seeks their biographic data, current FBS and HbA1C levels. Their blood and urine samples were taken and tested for FBS, HbA1C, Urine Culture (U/C), and Urine Analysis (U/A).

FBS was measured using pars azmoon kit (Iran). U/A parameters were analyzed by urine tapes (Bahar A fshan, Iran). Conventional microscopy method was used for observing the microscopic parameters. General culture medium for urine culture included Blood agar, Macconkey agar, and EMB agar. Differential tests were performed on Triple Sugar Iron agar (TSI), SIM agar, Citrate agar, Urea agar, MR-VP agar, and Bile sculin agar.

Statistical analysis

Statistical package for social sciences (SPSS v.21, IBM Inc., Chicago, IL, USA) software was used to analyze the data. Quantitative variables were described as mean and standard deviation while qualitative variables were described as frequencies and percentages.

Ethical considerations

The study was approved by the Ethics Committee of Tehran University of Medical Sciences (Ethics number: 32822-61-04-95). Participants answered the questionnaire anonymously and participation in the study was voluntarily.

Results

112 diabetic children with mean age of 9.08±3.2 were studied. 53 (47.3%) males and 59 (52.7%) females. The minimum and maximum ages were 1 and 15 years old. The mean FBS and HbA1C were 278.02±139.04 mg/dL and 10.24 %, respectively (Figure 1).

Few bacteria (1-3 bacteria/hpf) were seen in 30.4% of urine

samples examined, 6.3% had moderate (≥4 bacteria/hpf) and severe (≥30 bacteria/hpf) bacteria in their urine samples (Figures 2 and 3).

We found that 12 (10.7%) urine samples for culture tested positive (≥10^5 cfu/ml). Of this, 10 (83.3%) were females and 2 (16.7%) were males.

Pyuria (≥10 WBC/mL) was seen in 15 (13.4%) urine samples, of which 12 (80%) were females and 3 (20%) were males.

The microorganisms diagnosed were from Enterobacteriaceae family; however, the commonest microorganism was Escherichia coli (E. coli) species.

There was a significant correlation between age and number of WBC's seen in the urine samples (P value= 0.004, r= 0.270). Higher number of WBC was seen more in patients with ASB (p value< 0.05).

Discussion

The aim of this study was to assess the rate of ASB and pyuria, and to identify the impact diabetes has on these two factors among diabetic children. The study showed that presence of bacteria in urine samples among diabetic children was high (about 36.7% of studied participants) and from this population 36.5% had pyuria. Patients with diabetes mellitus are more susceptible to urinary tract infection than non-diabetics and also asymptomatic bacteriuria is prevalent among this population [21].

Of the total urine samples tested for culture, 10.7% were positive, with the corresponding participants not showing any signs or symptoms of urinary tract infections, indicating the prevalence of asymptomatic bacteriuria among this group. In other words, 29% of diabetic children who had bacteria in their urine also had ASB.

We also found that 83.3% of patients with ASB were females, suggesting a higher prevalence rate than in males. This is consistent with previous studies that found that urinary infections in diabetic females is higher (9-20%) than in males (3-11%) [22]. Another study reported the prevalence of bacteriuria among children (under 14 years old) to be 29%, of which 51% of participants had pyuria [13].

Urinary tract infection is one of the most prevalent bacterial infections in the primary care level and can easily be transmitted among children. Also, it is the most commonly reported nosocomial infection [23]. According to WHO, 17 to 29 million dollars is spent on nosocomial infections annually, of which 39% of this is spent on urinary tract infections [24].

Appropriate diagnosis of asymptomatic bacteriuria will prevent wrong usage of antimicrobials and antibiotics and eventually save excessive treatment cost [25].

In our study, Escherichia coli was the commonest microorganism detected in laboratory tests which in other studies is reported to cause 80% of urinary infections [26].

Urinary tract infection in children can cause parenchymal kidney disease, kidney fibrosis, and growth retardation [26].

Studies show that while the rate of diabetes among children in Iran is increasing, about 4% of healthy non-diabetic adults in Tehran join the prediabetic population annually [27].

Yeshitela, B. et al. reported in a cohort study that 10.9% of diabetic patients had urinary infections [28]. The prevalence of bacteriuria among Iranian women has also been reported to be 20% [29].

ABS has been seen in 1% of full-term infants, 3% of premature infants, and 2% of school-age girls in healthy conditions without diabetes [30].

Conclusion

Based on findings of this study, ASB is prevalent among diabetic children. We believe this is because diabetes provide a suitable environment for bacterial growth. Also, as the amount of bacteria was seen to increase in urine, so did WBC. This led to high prevalence of pyuria in bacteriuria cases.

Regarding gender, we found that asymptomatic bacteriuria and pyuria was higher in females than males.

Regular screening for pyuria and asymptomatic bacteriuria in diabetic children could help in early diagnosis and prevention of urinary tract infections.

As bacterial resistance has increased, correct diagnosis can help deal with this problem.

Acknowledge

This research has been supported by Tehran University of Medical Sciences & health Services grant.

References

1. Raz R. Asymptomatic bacteriuria. Clinical significance and management. International journal of antimicrobial agents. 2003; 22: 45-47.
2. Trautner BW, Grigoryan L. Approach to a positive urine culture in a patient without urinary symptoms. Infectious disease clinics of North America. 2014; 28: 15-31.
3. Awonuga D, Fawole A, Dada-Adegbola H, Olola F, Awonuga O. Asymptomatic bacteriuria in pregnancy: evaluation of reagent strips in comparison to microbiological culture. African journal of medicine and medical sciences. 2011; 40: 377-383.
4. Ezechi OC, Gab-Okafor CV, Oladele DA, Kalejaiye OO, Oke BO, Ekama SO, et al. Prevalence and risk factors of asymptomatic bacteriuria among pregnant Nigerians infected with HIV. The Journal of Maternal-Fetal & Neonatal Medicine. 2013; 26: 402-406.
5. Salem M, Matter R, Abdelmaksoud A, El Masry S. Prevalence of asymptomatic bacteriuria in Egyptian children and adolescents with type 1 diabetes mellitus. Journal of the Egyptian Society of Parasitology. 2009; 39: 951-962.
6. Mohammed A, Abdelfattah M, Ibraheem A, Younes A. A study of asymptomatic bacteriuria in Egyptian school-going children. African health sciences. 2016; 16: 69-74.
7. Boyko EJ, Fihn SD, Scholes D, Abraham L, Monsey B. Risk of urinary tract infection and asymptomatic bacteriuria among diabetic and nondiabetic postmenopausal women. American Journal of Epidemiology. 2005; 161: 557-564.
8. Wilke T, Bottger B, Berg B, Groth A, Botteman M, Yu S, et al. Healthcare Burden and Costs Associated with Urinary Tract Infections in Type 2 Diabetes Mellitus Patients: An Analysis Based on a Large Sample of 456,586 German Patients. Nephron. 2016; 132: 215-226.
9. Saadeh SA, Mattoo TK. Managing urinary tract infections. Pediatric nephrology (Berlin, Germany). 2011; 26: 1967-1976.
10. Ghafari M, Baigi V, Cheraghi Z, Doosti-Irani A. Correction: The Prevalence of Asymptomatic Bacteriuria in Iranian Pregnant Women: A Systematic Review and Meta-Analysis. PloS one. 2016; 11: e0165114.

11. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes-2018. Diabetes care. 2018; 41: 13-27.

12. Novotna M, Podzimek S, Broukal Z, Lencova E, Duskova J. Periodontal diseases and dental caries in children with type 1 diabetes mellitus. Mediators of inflammation. 2015; 2015.

13. Cinek O, Lanska V, Koloušková S, Šumník Z, Šnajderová M, Rønningen K, et al. Type 1 diabetes mellitus in Czech children diagnosed in 1990–1997: a significant increase in incidence and male predominance in the age group 0–4 years. Diabetic medicine. 2000; 17: 64-69.

14. Karvonen M, Viik-Kajander M, Moltchanova E, Libman I, LaPorte R, Tuomilehto J. Incidence of childhood type 1 diabetes worldwide. Diabetes Mondiale (DiaMond) Project Group. Diabetes care. 2000; 23: 1516-1526.

15. Harjutsalo V, Sjoberg L, Tuomilehto J. Time trends in the incidence of type 1 diabetes in Finnish children: a cohort study. Lancet (London, England). 2008; 371: 1777-1782.

16. Shi Y, Hu FB. The global implications of diabetes and cancer. Lancet (London, England). 2014; 383: 1947.

17. Chen L, Magliano DJ, Zimmet PZ. The worldwide epidemiology of type 2 diabetes mellitus--present and future perspectives. Nature reviews Endocrinology. 2011; 8: 228-236.

18. Abdul-Ghani MA, Tripathy D, DeFronzo RA. Contributions of beta-cell dysfunction and insulin resistance to the pathogenesis of impaired glucose tolerance and impaired fasting glucose. Diabetes Care. 2006; 29: 1130-1139.

19. Ruderman NB, Carling D, Prentki M, Cacicedo JM. AMPK, insulin resistance, and the metabolic syndrome. The Journal of clinical investigation. 2013; 123: 2764-2772.

20. Reusch JE, Manson JE. Management of Type 2 Diabetes in 2017: Getting to Goal. Jama. 2017; 317: 1015-1016.

21. Hamdan HZ, Kubbara E, Adam AM, Hassan OS, Suliman SO, Adam I. Urinary tract infections and antimicrobial sensitivity among diabetic patients at Khartoum, Sudan. Annals of clinical microbiology and antimicrobials. 2015; 14: 26.

22. Chiu P-F, Huang C-H, Liou H-H, Wu C-L, Wang S-C, Chang C-C. Long-term renal outcomes of episodic urinary tract infection in diabetic patients. Journal of Diabetes and its Complications. 2013; 27: 41-43.

23. Car J. BMJ Learning: Urinary tract infections in women: diagnosis and management in primary care. BMJ: British Medical Journal. 2006; 332: 94.

24. Foxman B. Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. The American journal of medicine. 2002; 113: 5-13.

25. Lee MJ, Kim M, Kim N-H, Kim C-J, Song K-H, Choe PG, et al. Why is asymptomatic bacteriuria overtreated?: A tertiary care institutional survey of resident physicians. BMC infectious diseases. 2015; 15: 289.

26. Gaspari RJ, Dickson E, Karlowsky J, Doern G. Antibiotic resistance trends in paediatric uropathogens. International journal of antimicrobial agents. 2005; 26: 267-271.

27. Azizi F. Ascending rate of diabetes and prediabetes in Iran (in persian).

28. Yeshitela B, Gebre-Selassie S, Feleke Y. Asymptomatic bacteriuria and symptomatic Urinary Tract Infections (UTI) in patients with diabetes mellitus in Tikur Anbessa Specialized University Hospital, Addis Ababa, Ethiopia. Ethiopian medical journal. 2012; 50: 239-249.

29. Bissong ME, Fon PN, Tabe-Besong FO, Akenji TN. Asymptomatic bacteriuria in diabetes mellitus patients in Southwest Cameroon. African health sciences. 2013; 13: 661-666.

30. Raz R. Asymptomatic bacteriuria. Clinical significance and management. Int J Antimicrob Agents. 2003; 22: 45-47.

Austin J Urol - Volume 5 Issue 1 - 2018
ISSN: 2472-3606 | www.austinpublishinggroup.com

Citation: Abdolrahim Poor Heravi S, Abdollahzadeh M, Jawula Salisu W, Rahimkhani M and Ali Taheri. Evaluation of Asymptomatic Bacteriuria and Pyuria in Diabetic Children Referred to Children's Medical Center in 2017-2016. Austin J Urol. 2018; 5(1): 1060.