British Journal of Medicine & Medical Research
13(6): 1-8, 2016, Article no.BJMMR.23248
ISSN: 2231-0614, NLM ID: 101570965

SCIENCEDOMAIN *international*
www.sciencedomain.org

Urinary Screening for Detection of Renal Abnormalities in Asymptomatic School Children, Sohag Governorate, Egypt

Ramadan A. Mahmoud[1*], Al-zahraa E. El Masry[1], Radwa S. Mohammad[1] and Fouad M. A. Yousef [2]

[1]Department of Pediatrics, Faculty of Medicine, Sohag University, Egypt.
[2]Department of Community Medicine, Faculty of Medicine, Sohag University, Egypt.

Authors' contributions

This work was carried out in collaboration between all authors. Authors RAM and RSM proposed the study, done dipstick urine screening and wrote the first draft. Authors FMAY and AZEEM analyzed the data and revised the first draft. All authors contributed to the design, interpretation of the study and to further drafts. All authors reviewed and proof the final draft of the paper.

Article Information

DOI: 10.9734/BJMMR/2016/23248
Editor(s):
(1) Toru Watanabe, Department of Pediatrics, Niigata City General Hospital, Japan.
(2) Costas Fourtounas, Faculty of Medicine, School of Health Sciences, University of Thessaly, Greece.
Reviewers:
(1) Takashi Ito, Hyogo University of Health Sciences, Japan.
(2) Varsha Wasudeorao Wankhade, Savitribai Phule Pune University, Pune, India.
(3) Vimal Master Sankar Raj, University of Illinois College of Medicine at Peoria, USA.
Complete Peer review History: http://sciencedomain.org/review-history/13087

Original Research Article

Received 22nd November 2015
Accepted 15th January 2016
Published 27th January 2016

ABSTRACT

Background: Dipstick urine analysis is the most common method for screening children for detecting urinary abnormalities. This study is aimed to estimate the frequency of urinary problems among children aged 6-13 years from five primary schools in different parts of the Sohag Governorate, Egypt.
Study Design and Setting: Cross-sectional study carried out by the Pediatrics Department and Community Medicine Departments at Sohag University, Egypt.
Study Duration: Study was conducted during the academic year of Egypt 2014-2015.
Methods: Urine analysis was performed for 2850 asymptomatic school children [1800 (63%) males and 1050 (37%) females]. Out of which, 1736 (61%) children were from rural areas and 1114 (39%) children were from urban areas. Microscopic examinations were performed for the

**Corresponding author: E-mail: ramadan.aboelhassan@yahoo.com;*

abnormal dipstick samples after two weeks. Urine culture and other investigations were done to determine the underlining urinary abnormities.

Results: The initial urinary screening by dipstick revealed 53 children (1.86%) had urine abnormities. Confirmatory test by complete microscopic examination of urine after 15 days showed that only 38 children (1.33%) still had urinary abnormalities. Twenty-one children (0.74%) had hematuria, three children (0.11%) had proteinuria and 14 children (0.49%) had pyuria. Urinary tract infections (UTIs) were diagnosed in 21 children (14 children with pyuria and seven children with hematuria) in whom further evaluation revealed UTIs. The most common bacteria in positive urine culture samples were gram-negative bacilli in 42.86% children.

Conclusion: Small number of asymptomatic renal abnormalities can be detected by dipstick urine screening. The common abnormalities were hematuria, UTIs and proteinuria. Hematuria and UTIs were more common in females than males. Further work is needed to determine value of early detection of renal disorders in childhood in preventing development of end-stage renal diseases.

Keywords: Urine analysis; hematuria; proteinuria; pyuria; school children.

1. INTRODUCTION

Chronic Kidney Disease (CKD) is a public health problem worldwide and has an increasing incidence among children [1,2]. Simple urine analysis is a powerful tool in the early identification of CKD [3]. Dipstick urine analysis is the most common method for screening children for CKD, effective in detecting urinary abnormalities and has a low cost [4,5]. The presence of detectable nitrite in urine has been used to diagnose urinary tract infection (UTI). UTI is very common in children and may lead to CKD and hypertension if untreated [6].

Screening for CKD is controversial [7]. However, there is a routine program involving annual screening of primary school children in some Asian countries [8-10]. In Egypt, the prevalence of urinary abnormalities detected by urine screening has varied from 1.3%-16.4% in a first screening and from 0.72%- 7.8% in a second screening [11-13]. However, these studies were conducted in North Egypt. Our study is the first to screen urinary abnormalities in South Egypt which lacks sufficient services and financial resources. This study was designed to screen the urine by dipstick of five primary school children aged 6-13 years in Sohag Governorate for detecting silent urinary abnormalities and underlying diseases.

2. PARTICIPANTS AND METHODS

2.1 Participant Selection

This cross sectional study was carried out in Sohag Governorate, during the academic year 2014-2015 by the Department of Pediatrics at Sohag University, in collaboration with the Department of Community Medicine at Sohag University.

A total of 2850 children (1800 males and 1050 females) aged 6-13 years from five primary schools in different parts of Sohag Governorate participated in this study. 1736 children were from rural areas and1114 children were from urban areas. Sohag Governorate in this study divided into five areas to represent all children in the Governorate. One school in Sohag city, one in El-Monshah (in the south), one in El-Maragha (in the north), one in Geheana (in the west) and one in Sakulta (in the east). Children were selected according to the following inclusion criteria: they must be between 6 and 13 years old, live in Sohag Governorate, and be apparently healthy. The present study was approved by the Research Committee of Sohag Medical Faculty at Sohag University, and written informed consent was obtained from all parents of the children.

Children less than 6 years or older than 13 years, children with a history of urinary abnormalities (i.e. dysuria, increased urinary frequency or urgency, or macroscopic hematuria), children known to have any renal disease or any other systemic disease, children on steroid therapy, any child with a fever at time of sample collection or any menstruating females were excluded from screening.

2.2 Specimen Collection

The parents were instructed how to obtain a clean mid-stream first morning urine specimen from their child. Vessels containing about 50 ml of urine were brought by parents to school in the

early morning. All students enrolled in this study were subjected to:

1. Urine analysis by using urine dipstick test strips.
2. Students with positive urinary findings in the first screen were retested again after 15 days with the same instructions in the primary specimen collection plus complete urine analysis.
3. Abdominal ultrasound was conducted for cases with positive urinary findings after the second screening.
4. Erythrocyte sedimentation rate, C-reactive protein, complement 3& 4, renal function test, serum albumin, 24 hour urinary protein, urine albumin/creatinine ratio, cholesterol level, coagulation profile (prothrombin time, activated partial thromboplastin time), serum calcium, phosphate, urine calcium/creatinine ratio, 24 hour urine calcium study were done according to the presumed diagnosis in each case. Hypercalciuria was diagnosed by 24 hour urine calcium study (more than 300mg/dl/day) in children had a positive calcium/creatinine ratio more than 0.2. Post-streptococcal glomerulonephritis (PSGN)) was diagnosed if cases with hematuria had low C3 level and evidence of streptococcal infection.
5. Urine culture with antibiotic sensitivity test was done for those with positive pus cells.
6. Cases were treated with specific treatment according to the results of antibiotic sensitivity.
7. Notification was sent to the parents for continuous follow-up and care of their children.

2.3 Detection of Urinary Abnormalities

The dipstick adopted in this screening was Medi-test Combi 10® SGL (Germany), which is capable of testing ten different parameters including: blood, urobilinogen, bilirubin, protein, nitrite, ketones, glucose, pH, density and leucocytes. In this study data from protein, blood, leucocytes, and nitrites were only analyzed.

The Dipstick test was performed by a pediatrician. Each reagent strip was dipped for approximately 1-2 second into the fresh urine. The color of the strip was compared to the color scale presented on the bottle's label. The best time for comparison is after 60 seconds. When testing, the urine should not be older than 2 hours.

2.4 Urine Analysis was Considered Abnormal if the Following Findings were Detected

- > 5 erythrocytes/µl (Green dots on yellow test: intact erythrocytes; Uniform green coloration of test: free hemoglobin or hemolyzed erythrocytes).
- 1+ or greater proteinuria (trace, 1+, 2+, 3+ corresponding to 10 mg/dl, 30 mg/dl, 100 mg/dl, 500 mg/dl respectively).
- The test for nitrites is a rapid screening method for possible asymptomatic urinary tract infections (UTIs) caused by nitrate-reducing bacteria as gram negative strains. These organisms have enzymes that reduce the nitrate present in urine to nitrite.
- Leukocytes more than 5 per high power field (40X) in a fresh urine sample indicate possible UTIs. The urine test strip test for white blood cells detects leukocyte esterase.

2.5 Statistical Analysis

Statistical analyses were done using SPSS (Statistical Package of Social Science) version 16. Qualitative data were expressed in the form of numbers and percentages. Differences between groups were evaluated by chi-square test. Fisher's exact test was used when indicated. Probability value (p value) less than 0.05 was considered statistically significant.

3. RESULTS

3.1 Prevalence of Urinary Abnormities in Initial Urinary Screening

Table 1 shows that for the initial urinary screening by dipstick 53 children (1.86%) were positive. Twenty-eight children were positive for RBCs (0.98%), 8 children (0.28%) for protein, 5 children (0.18%) for nitrite, 2 children (0.07%) for leucocytes, and 10 children (0.35%) for nitrite and leucocytes. Presence of nitrite and/or leucocytes is indicative of the possible UTI.

3.2 Prevalence of Urinary Abnormities in Confirmatory Urinary Screening

Confirmatory test via complete urine analysis conducted 15 days later showed that 38 children (1.33%) still had urinary abnormalities. Twenty-one children (0.74%) had hematuria, 3 children (0.11%) had proteinuria and 14 children (0.49%) had pyuria as shown in Table 1.

3.3 The Prevalence of Urinary Abnormities in Confirmatory Urinary Screening Related to Gender

Table 2 shows the urinary abnormalities in the confirmatory urinary screening. There were 1800 male children, eight had hematuria (0.44%), two had proteinuria (0.11%) and five had UTI (0.28%). Furthermore, from the total 1050 females included in the study, 13 had hematuria (1.24%), one had proteinuria (0.10%) and nine had UTI (0.86%). Both hematuria and UTI are more common in females than males with a statistically significant difference (0.02 & 0.03 respectively).

3.4 The Prevalence of Urinary Abnormities in Confirmatory Urinary Screening Related to Residence

Table 2 also shows the prevalence of urinary abnormalities among the screened cases. Out of 1114 children studied in a school in an urban area, nine had hematuria (0.81%), two children (0.18%) had proteinuria and six children (0.54%) had UTI. Out of 1736 children in schools located in rural areas, 12 children (0.69%) had hematuria, one child (0.06%) had proteinuria and eight children (0.46%) had UTI. There was no statistically significant difference between rural and urban areas regarding prevalence of the three urinary findings.

However, there were variations in the prevalence of urinary abnormalities after the second screening in different districts. Most cases came from Sohag city district (1.53%), followed by Saqulta city and Geheana city (1.38% each) then by El-Monshah city (1.15%) and El–Maragha city (0.92%). There were no statistically significant differences among them.

3.5 Causes of Renal Disorders in Children with Urinary Abnormalities

Table 3 shows the pattern of renal and urological disorders in children with hematuria. Out of 21 children with hematuria, the causes were hypercalciuria in ten children (47.62%), UTI in seven children (33.33%), PSGN and renal stones (two children (9.52%) for each of them).The causes of proteinuria were nephrotic syndrome in two children (66.67%) and orthostatic proteinuriain one case (33.33%). There were 21 children with UTI (14 children with pyuria, and seven children with hematuria in whom further evaluation revealed UTIs), nine (42.86%) children showed positive culture for gram negative bacilli with bacterial colony count > 10^5, five children (23.81%) showed positive culture for gram positive cocci with bacterial colony count >10^5, four children (19.05%) showed positive culture for both gram positive cocci and gram negative bacilli with bacterial colony count > $10^5$and three children (14.29%) showed bacterial growth but with colony count below10^5.

4. DISCUSSION

This study is the first to screen asymptomatic children for urinary abnormalities in South Egypt. In this study, we found that prevalence of urinary

Table 1. Prevalence of urinary abnormalities in initial and confirmatory screening in studied population

Urinary abnormalities	Initial screening (by urine dipstick)	Confirmatory screening (by complete urine analysis)
Hematuria	28 (0.98%)	21 (0.74%)
Proteinuria	8 (0.28)	3 (0.11%)
Urinary tract infection	17 (0.60%	14 (0.49%)
Any abnormalities	53 (1.86%)	38 (1.33%)

Table 2. Prevalence of urinary abnormalities in confirmatory screening by sex and residence

	Hematuria	Proteinuria	UTIs
Sex			
Males	8 (0.44%)	2 (0.11%)	5 (0.28%)
Females	13 (1.24%)	1 (0.10%)	9 (0.86%)
P value	0.02	1.00	0.03
Residence			
Urban	9 (0.81%)	2 (0.18%)	6 (0.54%)
Rural	12 (0.69%)	1 (0.06%)	8 (0.46%)
P value	0.72	0.57	0.77

UTIs: urinary tract infections

Table 3. Causes of renal disorders in children with urinary abnormalities

Urinary abnormality	Number of cases	Causes	Numbers of cases (%)
Hematuria	21	Hypercalciuria	10 (47.62%)
		Kidney stone	2 (9.52%)
		PSGN	2 (9.52%)
		UTI	7 (33.33%)
Protienuria	3	Nephrotic syndrome	2 (66.67%)
		Orthostatic protienuria	1 (33.33%)
Urinary tract infections	21	Gram negative bacilli	9 (42.85%)
		Gram positive bacilli	5(23.80%)
		Mixed growth	4 (19.04%)
		Bacterial count $<10^5$	3 (14.28%)

abnormities was 1.9% in initial urinary screening and 1.3% in the second screening. The results reported in the second screening were smaller than those reported in the first screening in this study as well as in many others studies [11,14, 15,16]. Repeat screenings were performed to eliminate false results. False positive urine analysis results are due to a variety of factors, including specimen contamination, presence of certain organisms and biological factors (exercise, exposure to cold, prolonged recumbence and medical illness). In addition, the urine dipstick being a manual test done by the physician and not by an automated machine, another important factor related to the physician is the correct usage of the test as a long immersion time may give a false positive result. Furthermore, there were also a possibility of false negative testing resulting; the test was not repeated for those with negative results. This may lead to miss some positive cases. This is one of the limitations of this study.

Comparing our results to other similar studies revealed that the percentage of hematuria, proteinuria, and UTIs in our data similar to Rao et al [14] and Shen et al. [15] reported in China, higher than those reported in by Bakr et al. [11] in Dakahlia city in North Egypt, Nodoshan et al. [16] in Yazd city in Iran, Parakh et al. [17] in India, Zainal et al. [18] in Malaysia, and Murakami et al. [19] in Tokyo city in Japan, and lower than those reported by Zein El-Abden et al. [12] in El-Garbyia city in North Egypt, El-Shafie et al. [13] in Monoufiya city in North Egypt, Dang et al. [20] in Vietnam, Hajar et al. [21] in Lebanon, Oviasu et al. [22] in Nigeria, and Plata et al. [23] in Bolivia.

In the present study, the prevalence of hematuria, proteinuria, and UTIs were 1.0%, 0.3%, and 0.6% respectively for the initial urinary screening and 0.7%, 0.1% and 0.5% respectively in the second screening. Hematuria was the most common abnormality reported in other Egyptian studies [11-13] and in other countries such as Lebanon [21] and India [24]. In the present study, 21 children with hematuria, the causes were hypercalciuria in ten children (47.62%), UTIs in seven children (33.33%), PSGN and renal stones (two children (9.52%) for each of them). The etiologies for hematuria in our study is similar to that of study done by El-Shafie et al. [13] but in different percentage. They reported hypercalciuria (83.10%), PSGN (1.80%) and UTIs (9.6%). Similarly, Chander J. et al. [25] found that 52.1% of children who were found to have silent abnormal urinalysis had no definite diagnosis, but organic kidney diseases and hypercalciuria accounted for 14.9% and 14.4%, respectively. On the contrary, a study in Dakahlia, Egypt [11] showed that glomerulonephritis (GN) was the most common responsible underlying cause. They found that of the 12 children with persistent urinary changes, eight children (66.7%) had evidence of GN. Hypercalciuria, renal stone and orthostatic proteinuria were the other underlying causes. In a Taiwanese study [9] 34.8% of the studied children had microscopic hematuria. Evaluation of these patients at a tertiary referral center identified GN as a cause in 52.3%, whereas 17.7% had familial benign hematuria or thin membrane disease. In 12% of cases, no known cause was identified. The main causes of GN in this group of children were lupus nephritis (31.6%) and IgA nephropathy (11.7%).

In this study only three cases tested positive for proteinuria after confirmatory complete urine analysis, two males and one female. One of them had orthostatic proteinuria and two of them were in the nephrotic range (>40 mg/m²/hr.) in 24-hr urine, were diagnosed as having nephrotic syndrome and were referred to the pediatric nephrology clinic for follow-up. In general, in

pediatric practice, the demonstration of proteinuria during a routine screening urine analysis is a common occurrence. The challenge is to differentiate between the child with proteinuria related to renal disease from the otherwise healthy child with transient or other benign forms of proteinuria [26]. El-Shafie et al. [13] in Monoufiya city in North Egypt, further evaluation of positive cases screened for proteinuria revealed most cases had transient proteinuria; some had orthostatic proteinuria, while few cases were diagnosed as having persistent isolated proteinuria. Two of them had proteinuria in the nephritic range and eight cases had nephrotic range in 24-hr urine.

In this study a total 21 children (14 children with pyuria and seven children with hematuria) had UTIs upon further evaluation; 18 (85.71%) children showed a positive culture with bacterial count above 10^5 and three children (14.3%) showed bacterial growth but with count below 10^5. In Minoufyia [13] urine culture was carried out for 500 children; of them 240 children had a positive culture. 150 children (62%) had a positive culture of E.coli, 42 children (17.3%) were positive for *Enterococcus Faecalis,* 25 children (10.3%) were positive for *Klebsiella Pneumonia* and 23 children (10.4%) were positive for coagulase negative staphylococci.

Furthermore, in a Turkish study, Nabigil and Tumer [27] found that 4.5% of primary school children had UTIs. Moreover, Litka et al. [28] reported in a Japanese study that the prevalence of UTIs among school age children was 0.29%. The different results reported by the previous studies could be explained by different methods of diagnosis and different socioeconomic levels. In children, the absence of both nitrite and leucocyte esterase in urine indicates that UTI is unlikely; however, positive dipstick tests for nitrite and/or leucocyte esterase are not specific indicators of UTI, and should not be used in place of laboratory examination. The dipstick method is most likely to be useful as a screening test to exclude UTI in children, but may be less suitable for infants who don't have enough time to form nitrites in bladder secondary to frequent voiding [29].

In the present study prevalence of hematuria and UTIs in girls was higher than in boys. Studies among school-age children have shown that bacteriuria among girls is 30 times prevalent compared to boys, attributed to the fact that girls have a short urethra which predisposes them to ascending bacterial infection [30]. Furthermore, the place of residence in the present study had no statistically significant effect on prevalence of hematuria, proteinuria and UTIs in the studied children and may be due to the socioeconomic status not differing between rural and urban areas in our Sohag Governorate. This was different than Minoufyia [13] where proteinuria, hematuria and UTIs were more common in rural areas than urban areas. Their finding was supported by Caksen et al. [31] and Yayeli et al. [32] who reported higher asymptomatic bacteriuria prevalence in school children of lower socioeconomic levels compared to higher levels. This association may be related to toilet education, cleaning of genital region or low immunity due to malnutrition [33].

At present, there is no clear consensus for developing countries on whether screening programs for CKD in children and adolescents should be undertaken. Mass urinary screening programs are well established in some Asian countries (Japan, Korea, and Taiwan), [34] but this is not the case for North America and Europe due to concern about cost effectiveness. Sekhar D et al. [35] and Bereket G et al. [36] analyzed the cost-effectiveness of urinary screening programs in children and infants, found them to be an ineffective procedure for primary care providers, and was supported by the recommendations of the American Academy of Pediatrics guidelines. However, ambiguity about screening children exists because of the uncertainty as to whether early detection of renal disorders in childhood will lead to effective interventions and reduction in the number of individuals who subsequently progress to end stage renal disease [7]. In developing countries, the national epidemiologic data on CKD in the pediatric population is currently limited [37]. Our finding showed low prevalence of abnormal findings 1.86% in the initial screening with only 1.33% (n=38) proven on follow-up. This includes 6 children with significant findings (2 cases kidney stone, 2 cases PSGN, 2 cases nephrotic syndrome). Other findings include UTI and hypercalciuria. Some may consider them as benign condition. However, UTI in early childhood could cause significant damage to kidneys including renal scars. Hypercalciuria could promote stone burden and osteopenia.

5. CONCLUSION

Small number of asymptomatic renal abnormalities can be detected by dipstick screening in this study. The common

abnormalities were hematuria, UTIs and proteinuria. Hematuria and UTIs were more common in females than males. Hematuria may underline serious kidney disease and UTI in early childhood could cause significant damage to kidneys including renal scars, so effort should be done to define the exact etiology of any abnormal finding. Further work will needed to determine value of early detection of renal disorders in childhood in effective interventions and reduction of development end-stage renal disease

ETHICAL APPROVAL

The present study was approved by the Research Committee of Sohag Medical Faculty at Sohag University, and written informed consent was obtained from all parents of the children.

ACKNOWLEDGEMENT

Authors thanks proof-reading services.com for linguistic editing.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Collins AJ, Foley RN, Chavers B, Gilbertson D, Herzog C, Johansen K, et al. United States Renal Data System 2011 Annual Data Report: Atlas of chronic kidney disease & end-stage renal disease in the United States. Am J Kidney Dis. 2012;59(1):e1-420.
2. Meguid EA, Bello AK. Chronic kidney disease: The global challenge. Lancet 2005;365(9456):331-40.
3. Hogg RJ, Furth S, Lemley KV, Portman R, Schwartz GJ, Coresh J, et al. National kidney foundation's kidney disease outcomes quality initiative clinical practice guidelines for chronic kidney disease in children and adolescents: Evaluation, classification, and stratification. Pediatrics. 2003;111(6):1416-21.
4. Marquette GP, Dillard T, Bietla S, Niebyl JR. The validity of the leukocyte esterase reagent test strip in detecting significant leukocyturia. Am J Obstet Gynecol. 1985;15;153(8):888-9.
5. Arm JP, Peile EB, Rainford DJ, Strike PW, Tettmar RE. Significance of dipstick haematuria. Correlation with microscopy of the urine.Br J Urol. 1986;58(2):211-7.
6. Gorelick MH, Shaw KN. Screening tests for urinary tract infection in children: A meta-analysis. Pediatrics. 1999;104(5):e54.
7. Hogg RJ. Screening for CKD in children: A global controversy. Clin J Am SocNephrol. 2009;4(2):509-15.
8. Murakami M, Yamamoto H, Ueda Y, Murakami K, Yamauchi K. Urinary screening of elementary and junior high-school children over a 13-year period in Tokyo. Pediatr Nephrol. 1991;5(1):50-3.
9. Lin CY, Hsieh CC, Chen WP, Yang LY, Wang HH.The underlying diseases and follow-up in Taiwanese children screened by urinalysis. Pediatr Nephrol. 2001;16(3): 232-7.
10. Cho BS, Kim SD, Choi YM, Kang HH. School urinalysis screening in Korea: Prevalence of chronic renal disease. Pediatr Nephrol. 2001;16(12):1126-8.
11. Bakr A, Sarhan A, Hammad A, Ragab M, Salama O, Al-Husseni F, et al. Asymptomatic urinary abnormalities among primary school children in Egypt. World J Pediatr. 2007;3:214-7.
12. Zein El-Abden MY, Abo-ElKheir OI, El-Sadek SM, El-Said AM, Awaad MA. Screening of renal diseases by urine analysis in primary school aged children at El-Gharbiya governorate-Egypt. Egy J Hosp Med. 2013;50:24-33.
13. El-ShafieAM, El-Nemr FM, Bahbah MH, Shokry M. The Role of Urine Screening (In School Children of Menoufiya Governorate) In Early Detection of Renal Disorders. Am J Sci. 2014;10:143-150.
14. Rao J, Zhou L, Shen Q, Sun L, Fang XY, Liu HM, et al. School urinalysis screening in Shanghai. World J Pediatr. 2006;2:195-8.
15. Shen T, Peng GI, Zhang HF, Huang ZQ, Zhang JY, Wang ZZ, et al. Urine routine screening of 34455 school children in Xiamen city. Chinese J Child Health Care. 2009;1:40-50.
16. Nodoshan A, Shajari A, Golzar A, Shakiba M. Urinary screening in primary school children in Yazd, Iran. Shiraz E-Med J. 2015;16(1):e23866
17. Parakh P, Bhatta NK, Mishra OP, Shrestha P, Budhathoki S, Majhi S, et al. Urinary screening for detection of renal abnormalities in asymptomatic school children. Nephrourol Mon. 2012;4(3): 551-5.

18. Zainal D, Baba A, Mustaffa BE. Screening proteinuria and hematuria in Malaysian children. Southeast Asian J Trop Med Public Health. 1995;26(4):785-8.
19. Murakami M, Yamamoto H, Ueda Y, Murakami K, Yamauchi K. Urinary screening of elementary and junior high-school children over a 13-year period in Tokyo. Pediatr Nephrol. 1991;5(1):50-3.
20. Dang LNN, Doan TLB, Pham TKA, Phan TH, Thi MHT, Janssen F, et al. Urinary abnormalities in asymptomatic children of ho chi minh city: A population-based study. Br J Med Med Res. 2014;4(12):54-57.
21. Hajar F, Taleb M, Aoun B, Shatila A. Dipstick urine analysis screening among asymptomatic school children. N Am J Med Sci. 2011;3(4):179-84.
22. Oviasu E, Oviasu SV. Urinary abnormalities in asymptomatic adolescent Nigerians. West Afr J Med. 1994; 13(3):152-5.
23. Plata R, Silva C, Yahuita J, Perez L, Schieppati A, Remuzzi G. The first clinical and epidemiological programme on renal disease in Bolivia: A model for prevention and early diagnosis of renal diseases in the developing countries. Nephrol Dial Transplant. 1998;13(12):3034-6.
24. Park YH, Choi JY, Chung HS, Koo JW, Kim SY, Namgoong MK, et al. Hematuria and proteinuria in a mass school urine screening test. Pediatr Nephrol. 2005; 20(8):1126-30.
25. Chandar J, Gomez-Marin O, del Pozo R, Sanders L, Montane B, Abitbol C, et al. Role of routine urinalysis in asymptomatic pediatric patients. ClinPediatr (Phila). 2005;44(1):43-8.
26. Hogg RJ, Portman RJ, Milliner D, Lemley KV, Eddy A, Ingelfinger J. Evaluation and management of proteinuria and nephrotic syndrome in children: Recommendations from a pediatric nephrology panel established at the National Kidney Foundation conference on proteinuria, albuminuria, risk, assessment, detection, and elimination (PARADE). Pediatrics. 2000;105(6):1242-9.
27. Nebigil I, Tumer N. Asymptomatic urinary tract infection in childhood. Eur J Pediatr. 1992;151(4):308-9.
28. Iitaka K, Oyama K, Sakai T, Izawa T, Tomuro M, Kanai K, et al. Screening for bacteriuria in healthy Japanese school children. Int J Pediatr Nephrol. 1984;5(3): 159-62.
29. Sharief N, Hameed M, Petts D. Use of rapid dipstick tests to exclude urinary tract infection in children. Br J Biomed Sci. 1998;55(4):242-6.
30. Keren R, Shaikh N, Pohl H, Gravens ML, Ivanova A, Zaoutis L, et al. Risk factors for recurrent urinary tract infection and renal scarring. Pediatrics. 2015;136(1):e13-21.
31. Caksen H, Arslan S, Abuhandan M, Celik A, Bozkurt H, Odabaş D. Asymptomatic bacteriuria in infants in eastern Turkey. ActaPaediatr Taiwan. 2001;42(6):338-9.
32. Yayli G, Yaman H, Demirdal T. Asymptomatic bacteriuria rates in school children: Results from a rural city in Turkey. J Trop Pediatr. 2003;49(4):228-30.
33. No authors listed. Female genital cutting. Evidence from the Demographic and Health Surveys. AfrPopulDev Bull. 1999:26-7.
34. Yap HK, Quek CM, Shen Q, Joshi V, Chia KS. Role of urinary screening programmes in children in the prevention of chronic kidney disease. Ann Acad Med Singapore. 2005;34(1):3-7.
35. Sekhar DL, Wang L, Hollenbeak CS, Widome MD, Paul IM. A cost-effectiveness analysis of screening urine dipsticks in well-child care. Pediatrics. 2010;125(4): 660-3.
36. Bereket G, Bozdogan G, Saribeyoglu E, Arapoglu M, Serteser M, Celiker A. Use of Urinalysis as a screening tool for asymptomatic infants. J Paediatr Child Health. 2013;49(6):458-61.
37. Gheissari A, Hemmatzadeh S, Merrikhi A, FadaeiTehrani S, Madihi Y. Chronic kidney disease in children: A report from a tertiary care center over11 years. J Nephropathol. 2012;1(3):177-82.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/13087