Prevalence Of Protienuria In A Symptomatic School Children From September 2018 To March 2019


Abstract: Background: Asymptomatic proteinuria is a common finding in primary care practice. Proteinuria in asymptomatic children especially if persistent and significant may be an early marker of chronic kidney disease, however, global controversy exists regarding the cost effectiveness of screening program in detection and prevention of chronic kidney disease in children. Objective: To study the prevalence of proteinuria in asymptomatic school children in BahriWasat administrative unit in Khartoum North Locality, Khartoum State, Sudan. Methods: This was a descriptive, cross-sectional, community-based study, that was conducted in schools located in BahriWasat administrative unit, in Khartoum north locality within the period from September 2018–March 2019 and covered 430 schoolchildren selected by multiple stage stratified sampling. Clean midstream urine was collected in a clean plastic container from participants; urine sample was examined by dipstick method for proteinuria, and. Data collected, prepared, entered, and analyzed using SPSS version 25.0. Results: This study covered 430 study participants. Concerning the results of urinary screening by dipstick, our study realized that the prevalence of proteinuria was 32(7.4%). Only 2(6.3%) of participants (who were positive for protein urea by dipstick), were significantly positive for early morning urine albumin who represent only (0.5%) of all study participants. Half of them were 50th – 90th BP centile, the mean of GFR 84.5 ml/min/1.73 m², Urea 24.5 mg, Creatinine 0.8 mg, and Urine albumin creatinine ratio found to be 31.0 mg of albumin/g of creatinine. The analysis found that there was no significant difference in the prevalence of proteinuria according to the gender (the prevalence was (7.5%) among males compared with (7.4%) among females with p-value = 0.97). There was no significant difference in the prevalence of proteinuria according to the age (the prevalence was (7.5%) among participants who age 5-10 years compared with (7.4%) among participants who age 11 - 15 with p-value = 0.97). Conclusion and recommendation: this study showed that the prevalence of proteinuria is 7.4 %, which similar to most study worldwide and we recommended no more screening for proteinuria by dipstick because it is not cost-effective and less sensitive and less specific in early detection of CKD.

Index Terms: Prevalence, Asymptomatic proteinuria, Schools, BahriWasat and Khartoum north administrative unit,

1 INTRODUCTION
Symptomatic proteinuria is a common finding in primary care practice. Most children with asymptomatic proteinuria, diagnosed at screening urinalysis, do not have kidney disease. [1] Proteinuria is the presence of abnormal quantities of protein in urine. Abnormal amounts of protein may appear in the urine from 3 possible mechanisms: glomerular proteinuria, tubular proteinuria, and increased production of plasma proteins. [2] When proteinuria is detected, it is important to determine whether it is transient, orthostatic, or persistent. [2] Transient proteinuria is most often associated with fever, exercise, or stress, and it resolves on urine testing when the cause was withdrawn. Orthostatic proteinuria is a benign and common condition in school-age children. Persistent proteinuria should be carefully evaluated because it is a marker of renal damage and associated with kidney disease. [3] It is not necessary to extensively investigate all children found to have proteinuria. Children with persistent proteinuria should be referred to as pediatric nephrologist to get a diagnosis and start treatment when necessary. [2] Detection and management of the renal problem in children are of major importance for chronic kidney disease prevention; this in turn will decrease the burden of chronic kidney disease in the pediatric population.

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[3] Screening for chronic kidney disease in children is global controversy. The primary bases for this controversy are uncertainty as to whether early detection of renal disorder in childhood will lead to effective intervention and reduction in the number of individual who develop end-stage renal disease. [4] A related concern is whether the adoption of urinary screening programs is cost-effective [4]. In December 2007 American Academy of Pediatrics published their latest recommendation in which no urine analysis was recommended at any age during childhood. Also, in Europe there is no more screening, although mass screening is now established to be effective in Japan, Taiwan, and Korea [5]. So, because most forms of kidney disease with glomerular pathology can become chronic and progressive, the Kidney Disease Outcomes QualityInitiative Guidelines of the National Kidney Foundation emphasize early detection of proteinuria and initiation of therapies that preserve kidney function. [6] Proteinuria is a marker of parenchymal injury in kidney disorders of diverse etiologies. [6] In Sudan, many of the Sudanese children with chronic kidney disease presented with late end-stage renal disease. The establishment of the comprehensive diagnostic, treatment and educating pediatricians countrywide has led to better early recognition, management and outcome of chronic kidney disease but still no sufficient data about the effectiveness of screening program in Sudan. [7] Urine analysis is recognized as the simplest and least expensive method for screening healthy children, and it is a cornerstone in the evaluation of the kidney function, the dipstick method is the most commonly implemented procedure. Moreover, dipstick has proven effect in prediction of rapidly declining kidney function. [6] It must be recognized that not all-abnormal result are clinically significant, and that false positive and false negative results can occur. So there is uncertainty as to whether early detection of renal disorder will lead to prevention of development of end stage renal disease. [6] Furthermore,
chronic kidney disease is a major problem in Sudan. In many patients, progression to end stage renal disease may start early in childhood period, so, early detection and management of renal disorders may prevent or slow down the silent deterioration of kidney function. [7] A school urine screening program can detect chronic renal disease in its early stage. When mass screening is used, the initial aggressive diagnostic procedures such as, renal biopsy may be avoided. In addition, a regular follow up for those children with abnormal screen is warranted. [8] The urinary dipstick is one of the most important tools in the current diagnosis procedure in pediatric nephrology. This test represents the best way to approach the most frequent conditions, i.e. proteinuria, hematuria, and urinary tract infection. It offers reliable information at a very low financial cost [8]. Proteinuria and hematuria are among the early manifestation of renal disease. Through this context, this study is an attempt to measure the prevalence of proteinuria in asymptomatic school children in BahriWasat administrative unit in Khartoum north locality, Khartoum State, Sudan from September 2018 to March 2019)

JUSTIFICATION / RATIONAL
Chronic kidney disease is a major public health problem that imposes an economic burden on health-care budgets worldwide. . The rate of progression to the end stage renal disease (ESRD) depended on the early detection of renal disease. Aiming from this study for early identification of kidney disease by screening of proteinuria by dipstick to provide opportunities to slow progression of the renal damage. Also there is paucity of research in Sudan assessing the effectiveness of the screening program for urine by dipstick in early detection of CKD.

2 MATERIAL AND METHOD

Study design
Descriptive, community based study, cross sectional study.

Study area
The study was conducted in schools located in BahriWasat administrative unit, in Khartoum north. This locality is one of the main localities in Khartoum state, located in northern area of Khartoum state. Geographically, the Khartoum North locality is located between latitudes 8-15 (45 degrees – 16 degrees) north and longitudinal (36 -31 degree ) and (25 degrees -34 degrees) to the east. Its extending borders are from the beach of the Blue Nile in the north and east and on the west course of the Nile river after the confluence of two tributaries in the yoke. It has an area of 5060 square kilometer thus covers quarter of the Khartoum state. The number of primary schools in Khartoum north locality 331 private school and 232 public school. Regarding BahriWasat administrative unit which extends from the street of the graves of Shambat to the north and south of Ahmed Qasim Street and to the west bounded by Al-Hijra Street and East Al-Anqa Street.

Study duration
The study was conducted within the period from September 2018 – March 2019. The detailed schedule of different steps of the study was shown on the coming parts of this document.

Study Population
This study covered primary school children in BahriWasat administrative unit, in Khartoum north locality.

1.4.1 Inclusion criteria:
• Age 5 – 15 years.
• No history of renal disease (dysuria, facial swelling frequency urgency, urgency).
• Apparently health child.
1.4.2 Exclusion criteria:
• Refused to participate in the study.
• Any child with systemic disease.

Sample size and technique
The total number of population (schoolchildren) = 6,822 (governmental schools) + 19,000 (private schools) = 25,822 schoolchildren.
The sample size for this study was determined using this formula:

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N = \frac{N \times Z^2 \times P \times q}{N \times d^2 + Z^2 \times P \times q}
\]

- N : population = 25,822
- Z: 1.96
- P: 0.5
- q : 1 – p = 0.5
- d: 0.05 and d^2 = 0.0025

The sample size was = \( \frac{24,782}{65.51} \) = 378.4 or 375 schoolchildren

The sample size was increased with about 10% to consider for missing data and the possibility of non-response. The final sample size was 430 schoolchildren.

Sampling technique
Representative sample was selected by multiple stage-stratified samples as follow:
• Two schools from public sector as follow: One for the boys and the other for girls.
• Two schools from private sector as follow: One for girls and the other for boys. Lastly, the children were selected from each school randomly proportional to the size of population in each school.

Data collection tools /methods
The data was collected by interview-based questionnaire with observation for proteinuria by urine dipstick. Midstream
sample urine was collected in clean plastic container. The urine is tested within half hour by dipstick and result obtains immediately by change in color. The sample is repeated if positive by early voiding urinary screening. Then renal function (RFT), blood pressure BP, glomerular filtration rate (GFR) and albumin creatinine ratio (ACR) measurement for positive patient had been done.

Study variables
- Independent variables: Age, sex
- Dependent variables: Proteinuria in urine

Plan of analysis
Data entry, analysis and presentation
- Data was entered, cleaned, and analyzed using SPSS version 22.0
- Descriptive statistics in term of frequency tables with percentages and graphs. Means and standard deviations were presented with relevant graphical representation for quantitative data.
- Bi-variable analysis to determine the associations between the main outcome variable (presence proteinuria) and the other relevant factors (such as age, sex etc) with Chi square test (for categorical variables) and t-test (quantitative variables) statistical tests.
- P value of 0.05 or less is considered statistically significant.
- Data was represented after analysis in form of univariable tables, cross tabulation (bi variable tables), figures and narrative illustration.

Ethical considerations
- Ethical clearance obtains from Research Ethical committee at SMSB.
- Written ethical clearance obtained from the administrative authority of schools involved within the study area.
- A written consent taken individually from all participants parent.

Patient with positive proteinuria and sign of chronic kidney disease was investigated, treated and referred for nephrology unit.

3 RESULTS
This study covered 430 study participants. Concerning the results of urinary screening by dipstick, our study realized that the prevalence of proteinuria was 32(7.4%) as shown in table 1. Our study found that 2(6.3%) of participants (who were positive for proteinuria by dipstick), were significantly positive for early morning urine albumin who represent only (0.5%) of all study participants as shown in table 2 and 3. In regards to their blood pressure, half of participants who was positive for early morning protienuria were between 50th – 90th BP centile, the mean of: GFR 84.5ml/min/1.73m², Urea 24.5mg, Creatinine 0.8mg, and Urine albumin creatinine ratio 31.0 mg of albumin /g of creatinine as shown in table and 4. The analysis found that there was no significant difference in the prevalence of proteinuria according to the gender (the prevalence was (7.5%) among males compared with (7.4%) among females with p value = 0.97) as showed in table 5. Furthermore, the study found that there was no significant difference in the prevalence of proteinuria according to the age (the prevalence was (7.5%) among participants who age 5-10 years compared with (7.4%) among participants who age 11 - 15 with p value = 0.97) as showed in table 6.

4 DISCUSSION:
Our study was a descriptive, cross sectional, community-based study that was conducted in schools located in BahrIWasat administrative unit, in Khartoum north locality within the period from September 2018 –March 2019. Our primary end point was to identify the prevalence of asymptomatic proteinuria in asymptomatic school children. We
were able to screen 430 participants. In our study, we found that the prevalence of proteinuria in asymptomatic schoolchildren was (7.4%). That was consistent with study done in Sudan by Elsharif Ahmed Etal in 2015, which found prevalence of proteinuria in asymptomatic children in Elementary school – Kosti city is 6.3% [11]. In contrast to other studies done by Omer SaeedMagzoubetal in 2014 which show higher prevalence (11.7%) in White Nile State and low prevalence (3%) in Egypt in another study done by Ali Metal 2014 [40]. In our study we found that two (0.5%) of all study participants have persistent results positive for early morning proteinuria which was comparable to study done in Nepal by prince Parakhetal in 2012, which reported (0.71%) of cases tested positive in a second screening [42]. In contrast to another study done in Indonesia by Partini P etal showed slightly higher prevalence of persistent proteinuria (1.4%) on further evaluation. [43]. Those two participants, who were found to have persistent positive results for early morning proteinuria, were further evaluated in form of (BP, GFR, RFT, UACR). All of them had normal renal profile and normal GFR with mean GFR84.5ml/min/1.73m2, that was consist with previous study done in sudan by Omer SaeedMagzoubetal.

In Taiwan large screening done by Lin CY and Sheng CCetal in 2000 they found that 189 children from 10,288;620 had impaired GFR and they concluded that early detection of student with heavy proteinuria by mass urinary screening, early appropriate treatment and monitoring of significant risk factors may help to decrease the progression of renal disease [47]. In Japan a study conducted by Mutsumi Murakami etal found that the school-screening program in Japan represents a highly effective mass screening technique resulted in fewer ESRD patients younger than 20 starting treatment compare to the US [48]). However, In December 2007 American Academy of Pediatrics published their latest recommendation in which no urine analysis was recommended at any age during childhood since it was not cost-effective [5]. Another study in Kaplan etal 1997 was done to evaluate the cost effectiveness of urinary screening recommended that multiple screening dipstick in asymptomatic pediatric patients are costly and should be discontinue. And they concluded a single screening dipstick urinalysis to be obtained at school entry age between 5 and 6 yrs in all asymptomatic children, sample should be first morning void [5]. In regard to age in our study we found the age had no impact on the prevalence of proteinuria. The prevalence was (7.5%) among participants with an age of 5-10 years compared with (7.4%) among participants with an age of 11 - 15 with p value = 0.97), this is similar to study done by Ali Gul, etal in Turkish children 2017 who state that no significant difference was observed in the prevalence of proteinuria between boys and girls [52], This is in contrast to previous study done by Partini Petal which found the prevalence of proteinuria increase with age [43]. In a study done in Iran by Moisheen Jaruelatal by in 2018, the researcher found the frequency of positive dipstick proteinuria was significantly higher in girls than boys (29.6% vs 20.9%, respectively, p=0.04) [42] also Partini Petal found higher prevalence of proteinuria in girl [43]. In our study we found there was no significant difference in the prevalence according to the gender, the prevalence was (7.5%) among males compared with (7.4%) among females with p value = 0.97). Previous study done in 2015 confirmed the same finding [12].

5 CONCLUSION

The study determined the prevalence of proteinuria in asymptomatic school children in Bahri Wasat administrative unit in Khartoum North Locality, Khartoum State, Sudan covered 430 schoolchildren. The study results have shown that the point prevalence rate of proteinuria in asymptomatic school children was similar to most study done worldwide. The presence of proteinuria in urine is a common finding in children and is usually benign. There was no significant deference between the age and gender in the prevalence of proteinuria. Significantly low prevalence for children with persistent early morning proteinuria and all of them have normal investigation on further evaluation. This study also raises question about the cost benefit ratio for the national implementation of the urine-screening program. Screening for proteinuria by dipstick is less specific and less sensitive in early detection of CKD.

6 RECOMMENDATIONS: -

- To investigate for proteinuria in children by early morning urine sample because it is more reliable than spot urine sample.
- It is time for pediatric nephrologists around the world to develop a global response regarding the need for screening studies to permit the early identification of children with CKD.
- The cost effectiveness of the program should be confirmed periodically in order to maintain enthusiasm for the program.
- The establishment of the comprehensive diagnostic, treatment and educating pediatricians countrywide can led to better early recognition, management and better outcome of chronic kidney disease.
- No more screening for proteinuria by dipstick because it is costly and less sensitive and less specific in early detection of CKD.

7 REFERENCES

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