Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

ArticleDOI:10.21474/IJAR01/1332
DOI URL: http://dx.doi.org/10.21474/IJAR01/1332

RESEARCH ARTICLE

CHRONIC KIDNEY DISEASE IN CHILDREN IN ARAR, KINGDOM OF SAUDI ARABIA

Zeinab Mohmad Ibrahim Ory[1], Nagah Mohamed Aboel-Fetoh[2], Nesreen A. Mohammed[3], Asma Hamoud Alruwaili[4], Amjad Hamoud Alruwaili[4] and Aishah Mohammed Alenezi[4].

1. Assistant professor of pediatrics, Faculty of Medicine, Northern border University, Arar, KSA.
2. Associate Professor, of Public Health and Community Medicine, Faculty of Medicine,Sohag University, Sohag, Egypt. AndFaculty of Medicine, Northern border University, Arar, KSA.
3. Lecturer of Public Health and Community Medicine, Faculty of Medicine, Sohag University, Sohag, Egypt.
4. Intern, Faculty of Medicine, Northern border University, Arar, KSA.

Manuscript Info

Manuscript History

Received: 15 June 2016
Final Accepted: 19 July 2016
Published: August 2016

Key words:-
kidney disease, chronic renal disease, end-stage renal disease, children, pediatric nephrology

Abstract

Worldwide, chronic kidney disease (CKD) is a major public health problem and extensive research in the epidemiology of CKD in the adult population is available. On the other hand, little is known about the epidemiology of CKD in the pediatric population.Aim of the study:This study was conducted to identify factors associated with chronic renal diseases in children in Arar, Kingdom of Saudi Arabia. Subjects and methods:This study was conducted in child and maternity hospital in Arar, Kingdom of Saudi Arabia and included 100 patients admitted to the hospital. The hospital was reviewed for a period of 2 months (from May to June, 2016). The admitted children were interviewed and included in the study. A questionnaire was designed to obtain data about factors associated with chronic renal diseases in children. collecting data was conducted through interviewing patients included in the study.Results: Findings showed that 7% of the studied children had CKD. There was a significant difference between children with CKD and those who were free of CKD regarding parents' consanguinity, family history, family income while there was no observed significant effect of age, sex, birth order, mother age and exposure to passive smoking. Conclusion: CKD was associated with some sociodemographic characteristics such as parents' consanguinity, family history, family income while other factors (age, sex, birth order, mother age and exposure to passive smoking) had no significant effect on CKD occurrence among the studied children. CKD is a serious health problem and strategies are urgently needed for CKD prevention, raising public awareness and early CKD detection and treatment.

Corresponding Author:Nagah Mohamed Aboel-Fetoh.
Address: Associate Professor, of Public Health and Community Medicine, Faculty of Medicine, Northern Border University, Arar City, KSA.

Introduction:

The global burden of kidney diseases is rising, and several causes first begin early in childhood [1]. The number of deaths attributable to chronic kidney disease (CKD) has almost doubled globally in the past 20 years. In addition, CKD is among the top 20 causes of death worldwide (2).

CKD is a major public health problem and extensive research in the epidemiology of CKD in the adult population is available. On the other hand, little is known about the epidemiological features of CKD in the younger population [3]

CKD is defined as evidence for bilateral kidney damage for more than 3 months, which can be structural or functional, with or without a decrease in glomerular filtration rate [4]. During the pediatric age, the presence of CKD at any stage is a strong predictor for deterioration of renal function later in lifetime [5].

Moreover, urinary tract infection, acute glomerulonephritis and nephrotic syndrome can be considered as risk factors for the development of chronic kidney disease if not detected early and managed promptly [6, 7].

Children are in early stages of development and they aren't like adults, who have completed their maturation, and therefore are particularly prone to the adverse effects of CKD. Early detection and aggressive management are essential to improve outcomes in young patients with CKD[8, 9].

In addition to the common complications of CKD which include hyperkalemia, proteinuria, hypertension, anemia, acidosis, and metabolic bone disease[10, 11], children with CKD have problems such as growth failure and cognitive impairment[12]. Few studies have elaborated the prevalence of these complications in childhood onset CKD[13].

Moreover, children and adolescents with CKD are at risk of premature death, mostly from cardiovascular disease. The mortality rate of children with CKD requiring renal replacement therapy is at least 30-times higher than the age-matched healthy children, and health outcomes are not improving [14, 15].

Several studies investigated the association between socio-demographic, economic and personal factors and CKD outcomes and revealed that this relation was complex and multifactorial l[16]. It is essential to understand the epidemiology of CKD in children to make an accurate and early diagnosis, determine preventable or reversible causes of progression, predict prognosis, and help the counseling of the affected children and their families[17].

So this study was conducted to identify epidemiological factors associated with chronic renal diseases in children in Arar, Kingdom of Saudi Arabia.

Subjects and Methods:

This study is a hospital based cross sectional study conducted in the Child and Maternity Hospital in Arar, Kingdom of Saudi Arabia and included 100 children admitted to the hospital. The hospital was reviewed for a period of 2 months (from May to June, 2016). All the admitted children during the study period were included in the study.

Data Collection Method:

A questionnaire was designed to obtain data about factors associated with chronic renal disease in children in Arar, Kingdom of Saudi Arabia. Collecting data was conducted through interviewing parents admitted with their children included in the study.

The questionnaire included questions about socio-demographic characteristics of the participants, including age, sex, child order between siblings, average family income per month and parents' education, work and consanguinity. In addition, the questionnaire included inquiries about presence of chronic kidney diseases, comorbidities and some disease related parameters of the studied children.

Data Analysis and Presentation:

SPSS program version 16 was used for data entry and analysis. Qualitative data were presented as numbers and percentages. comparison between groups was assessed using the chi-squared test, with p-value less than 0.05 was considered statistically significant.

Ethical consideration:
This study was reviewed and approved by the Research Ethics Committee of Faculty of Medicine, Northern Border University. Parents of the studied children were informed that participation is completely voluntary. Informed consent after explaining the aim of the study was obtained from parents of all children included in the study. The questionnaires used in data collection were anonymous and confidentiality of data was assured.

Results:

One hundred children were included in this study, 60 children were male, 19 children were in the age group < 1 year, 27% were between 2 and 5-year-old and 21 children were in the age group 6-9 year. The birth order of 39% of the studied children was the first child between their siblings and only 10 of them were the last in order between siblings. Forty children had mothers who were between 30-40 year-old and 44 children had fathers in the same age group.

No consanguinity was reported between parents of most of the studied children (90%). More than half of the studied children had their parents with university education. Mothers of 64% of the studied children were house wives and fathers of 41% of the studied children worked as teachers. Of the studied children, 45% had family income between 11000 and 15000 SR (Table 2).

Table2: Sociodemographic characteristics of the studied children.

Age group	No (n = 100)	%
< 1 year	19	19.0
1 y	14	14.0
1-2 year	19	19.0
2-5 year	27	27.0
6-9 year	21	21.0
Sex		
Female	40	40.0
Male	60	60.0
Child order between siblings		
1st one	39	39.0
2nd one	20	20.0
3rd one	14	14.0
4th one	6	6.0
5th one	5	5.0
more than 5th	6	6.0
last one	10	10.0
Age of the mother		
< 20 years	1	1.0
< 30 years	32	32.0
30-40 years	41	41.0
40-50 Years	26	26.0
< 20 years	1	1.0
< 30 years	32	32.0
Age of the father		
>60	1	1.0
20-30 years	19	19.0
30-40 years	44	44.0
40-50 Years	29	29.0
50-60 years	7	7.0
>60	1	1.0
Consanguinity		
1st degree	8	8.0
2nd degree	2	2.0
no	90	90.0
Mother's education		

1ry school	8	8.0
2ry school	9	9.0
intermediate school	2	2.0
not educated	25	25.0
University	56	56.0
Father's education		
1ry school	6	6.0
2ry school	35	35.0
not educated	1	1.0
University	58	58.0
Mother's work		
house wife	64	64.0
Nurse	9	9.0
Teacher	27	27.0
Father's work		
not work	1	1.0
nurse	16	16.0
retired	5	5.0
soldier	31	31.0
teacher	41	41.0
work in private sector	6	6.0
Family income range		
< 8000 SR*	8	8.0
8000-10000 SR	37	37.0
11000-15000 SR	45	45.0
>15000 SR	10	10.0

SR* Saudi Ryal

Seven children had chronic kidney diseases,four of whom had nephrotic syndrome, one child had nephrolithiasis, another child had post streptococcal glomerulonephritis and HTN grade2 and the last one had chronic renal failure and on dialysis (Table 1).

Table 1: Chronic kidney disease in the studied children.

Chronic renal diseases	Frequency	Percent
No	93	93.0
Yes	7	7.0
• Nephrolithiasis	1	1.0
• Nephrotic syndrome	4	4.0
• Post strept. glomerulonephritis and HTN grade2	1	1.0
• Chronic renal failure (on dialysis)	1	1.0
Total	100	100.0

Table 3 presents some important characteristics of the studied children. Most of the studied children (94%) had no chronic diseases, three children had asthma, one had chronic iron deficiency anemia, another had diabetes mellitus and the last had epilepsy. 17 % had positive history of exposure to passive smoking. More than half (52%) of the studied children were underweight. Most of the studied children (92%) had no family history of renal disease and 98% of them had no history of prior hospitalization due to CKD.

As regards the relationship between chronic renal disease and socio-demographic variables in the studied children, there was a significant difference between children with CKD and those who were free of CKD regarding parents' consanguinity where consanguinity between parents was reported in more than 28% of children with CKD and only 8.6% of children with no CKD. Moreover, 28.6% of CKD patients and 6.5% of free children had positive family history and family income < 8000 SR. these differences were statistically significant. On the other hand, no significant effect of age, sex, birth order, mother age and exposure to passive smoking was observed on CKD occurrence among the studied children (Table 4,5).

Table 3:-Some important characteristics of the studied children.

Variable	No (n = 100)	%
Chronic diseases		
Asthma	3	3.0
Chronic iron deficiency anemia	1	1.0
DM	1	1.0
Epilepsy	1	1.0
No	94	94.0
Exposure to passive smoking		
No	83	83.0
Yes	17	17.0
Obesity		
Underweight	52	52.0
Normal	44	44.0
Overweight	3	3.0
Obese	1	1.0
Family history of renal disease		
Yes	8	8.0
No	92	92.0
Hospitalization due to CKD		
3 times	1	1.0
6 times	1	1.0
No	98	98.0
Surgery		
No	100	100.0
Dysmorphic features		
No	100	100.0
Death of family member due to renal failure		
No	100	100.0

Table 4:-The relationship between chronic renal disease and socio-demographic variables in the studied children.

Variable		Chronic renal disease		Total	Chi square	P-value
		No	Yes			
Sex						
Female	No.	39	1	39	.238	.1490
	%	41.9%	14.3%	41.9%		
Male	No.	54	6	54		
	%	58.1%	85.7%	58.1%		
Age group						
1 y	No.	14	0	14	NA	NA
	%	15.1%	.0%	14.0%		
1-2 year	No.	18	1	19		
	%	19.4%	14.3%	19.0%		
2-5 year	No.	23	4	27		
	%	24.7%	57.1%	27.0%		
6-9 year	No.	20	1	21		
	%	21.5%	14.3%	21.0%		
< 1 year	No.	18	1	19		
	%	19.4%	14.3%	19.0%		
Arrangement						
1st one	No.	36	3	39	NA	NA
	%	38.7%	42.9%	39.0%		
2nd one	No.	19	1	20		
	%	20.4%	14.3%	20.0%		

3rd one	No.	13	1	14		
	%	14.0%	14.3%	14.0%		
4th one	No.	6	0	6		
	%	6.5%	0.0%	6.0%		
5th one	No.	5	0	5		
		5.4%	0.0%	5.0%		
more than 5th	No.	6	0	6		
	%	6.5%	0.0%	6.0%		
last one	No.	8	2	10		
	%	8.6%	28.6%	10.0%		
Mother's age						
< 20 years	No.	1	0	1	0.97	0.80
	%	1.1%	0.0%	1.0%		
20-30 years	No.	30	2	32		
	%	32.3%	28.6%	32.0%		
30-40 years	No.	37	4	41		
	%	39.8%	57.1%	41.0%		
40-50 Years	No.	25	1	26		
	%	26.9%	14.3%	26.0%		
Consanguinity						
1st degree	No.	7	1	8	6.34	0.04
	%	7.5%	14.3%	8.0%		
2nd degree	No.	1	1	2		
	%	1.1%	14.3%	2.0%		
No	No.	85	5	90		
	%	91.4%	71.4%	90.0%		
Family history						
Yes	No.	6	2	8	27.1	0.000
	%	6.5%	28.6%	8.0%		
No	No.	87	5	92		
	%	93.5%	71.4%	92.0%		
Family income range						
< 8000 SR	No.	6	2	8	8.30	0.04
	%	6.5%	28.6%	8.0%		
8000-10000 SR	No.	35	2	37		
	%	37.6%	28.6%	37.0%		
11000-15000 SR	No.	44	1	45		
	%	47.3%	14.3%	45.0%		
>15000 SR	No.	8	2	10		
	%	8.6%	28.6%	10.0%		

Table 5: The relationship between chronic renal disease and some disease related variables in the studied children.

Variable		Chronic renal disease		Total	Chi square	P-value
		No	Yes			
Exposure to passive smoking					NA	NA
No	No.	76	7	83		
	%	81.7%	100.0%	83.0%		
Yes	No.	17	0	17		
	%	18.3%	0.0%	17.0%		
Associated chronic diseases						
DM	No.	1	0	1	NA	NA
	%	1.1%	0.0%	1.0%		
Asthma	No.	2	1	3		
	%	2.2%	14.3%	3.0%		

Chronic iron deficiency	No.	0	1	1		
	%	0.0%	14.3%	1.0%		
Epilepsy	No.	1	0	1		
	%	1.1%	0.0%	1.0%		
No	No.	89	5	94		
	%	95.7%	71.4%	94.0%		
Hospitalization due to renal disease						
3 times	No.	0	1	1	NA	NA
	%	.0%	14.3%	1.0%		
6 times	No.	0	1	1		
	%	.0%	14.3%	1.0%		
No	No.	93	5	98		
	%	100.0%	71.4%	98.0%		

NA (not applicable)

Discussion:

CKD is currently recognized as an important population health problem worldwide with increased risk of premature death among children and adolescents with chronic kidney disease.

According to the findings of the current study, the most common cause of kidney disease in the studied children was nephrotic syndrome which is inconsistent with a study conducted in Poland by Kiliś-Pstrusińska K., et al [18] where the highest proportion of CKD causes was anomaly of kidney and urinary tract. Studies conducted by Safouh H., et al[19] and Staples A.O., et al [20] revealed that the most common diagnosis was obstructive uropathy. In addition, Olowu W.A., et al [21] revealed in a study conducted in Nigeria that the most common etiology of CKD among the studied population was glomerular disease and in a study conducted by Cerón A., et al[22], the most frequent presentation was chronic renal failure.

Of the studied children with CKD, 28.6% had a positive family history of renal diseases which is higher than the findings of Kiliś-Pstrusińska K., et al [18] who elaborated that only 13.3% of the studied children with CKD had family renal history and Carlos M.O., et al.[23]who reported that only 21.6% of the studied population had positive family history.

Results of the current study revealed that 71.4% of children with CKD didn't have associated chronic disease which is lower than the findings of the study conducted by Kiliś-Pstrusińska K., et al [18] where 87.7 % of the studied children with CKD had no comorbidities. On the other hand, these findings was higher than the results of Chiou Y-Y.,et al [24] who reported that about half of the studied children had associated comorbidities.

Age and sex had no significant effect on the occurrence of CKD which isn't in line with the findings of Carlos M.O., et al.[23] who conducted a study in the BajoLempa region of El Salvador and found that age and sex were significantly associated with CKD. Another study conducted by Sidy M.S., et al [25] revealed that age among the main factors associated with CKD. On the other hand, these findings were consistent with the studies conducted by Cerón A., et al[22] and Chiou Y-Y.,et al [24] who revealed that age and sex weren't significantly associated with CKD progression.

Moreover, 28.6% of CKD patients and 6.5% of free children had positive family history and this difference was statistically significant which is in agreement with the findings of the studies done by Carlos M.O., et al.[23] and Sidy M.S., et al [25] where family history of CKD was significantly associated with CKD in the study population. The findings of the current study weren't in line with Chiou Y-Y.,et al [24] who revealed that family history of renal disease wasn't significantly associated with CKD progression.

It has been widely demonstrated that poverty had negative consequences on all levels of health and educational outcomes in children with chronic illnesses [11]. In the current study, it was elaborated that 28.6% of CKD children and 6.5% of free children had family income < 8000 SR. and this difference was statistically significant. This is in line with the findings of Kiliś-Pstrusińska K., et al [18] who reported that the financial situation of the studied CKD families was not good.

Study limitations:

The present study has some limitations. First, the small sample size so additional investigation in a larger sample size. Further, as a cross-sectional survey, causality cannot be tested.

Conclusion and Recommendations:

This study points to the necessity of continued research and data collection on CKD in children in Arar, Kingdom of Saudi Arabia. CKD was associated with some sociodemographic characteristics such parents' consanguinity, family history, family income while other factors (age, sex, birth order, mother age and exposure to passive smoking) had no significant effect on CKD occurrence among the studied children. CKD is a serious health problem with increased risk of premature death among children and adolescents and strategies are urgently needed for CKD prevention, raising public awareness and early CKD detection and treatment.

Acknowledgements:

The authors would like to acknowledge all parents of children participating in the study and the hospital health workers who motivated them to take part in the study.

Conflict of Interest: nil
Source of Funding: nil

References:

1. Neema M. K., Luke R. S., Jacob E. T., Emily Y. C., Daniel W.F., Kevin J.P., et al. Kidney disease among children in sub-Saharan Africa: systematic review. Pediatric Research. 2015;27(2):272-81.
2. Lozano R., Naghavi M., Foreman K. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012;380:2095–128.
3. Greenbaum L.A., Warady B.A., Furth S.L. Current advances in chronic kidney disease in children: growth, cardiovascular, and neurocognitive risk factors. Semin Nephrol. 2009;29:425–34.
4. Hogg R.J., Furth S., Lemley K.V. 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 Pt 1):1416–21.
5. Neild G.H. What do we know about chronic renal failure in young adults? I. Primary renal disease. Pediatr Nephrol. 2009;24(10):1913–9.
6. Ezeonwu B., Okike C., Oguonu T., Nwankwo O. Pattern of renal diseases in children admitted into the paediatric ward of Federal Medical Center, Asaba. Afr J Nephrol. 2013;1:6-9.
7. Etuk I.S., Anah M.U., Ochighs S.O., Eyong M. Pattern of paediatric renal disease in inpatients in Calabar, Nigeria. Trop Doct. 2006;36:256.
8. Lin C.Y., Sheng C.C., Chen C.H., Lin C.C., Chou P. The prevalence of heavy proteinuria and progression risk factors in children undergoing urinary screening. Pediatr Nephrol. 2000;14:953–9.
9. Susan L. F., Stephen R. C., Marva M., Frederick K., Robert M., George S., et al. Design and Methods of the Chronic Kidney Disease in Children (CKiD) Prospective Cohort Study. Clin J Am Soc Nephrol. 2006;1:1006–15.
10. McGonigle R.J., Boineau F.G., Beckman B . Erythropoietin and inhibitors of in vitro erythropoiesis in the development of anemia in children with renal disease. J Lab Clin Med. 1985;105:449–58.
11. Wong H., Mylrea K., Feber J., Drukker A., Filler G. Prevalence of complications in children with chronic kidney disease according to KDOQI. Kidney International. 2006;70:585–90.
12. Hulstijn-Dirkmaat G.M., Damhuis I.H., Jetten M.L. The cognitive development of pre-school children treated for chronic renal failure. Pediatr Nephrol. 1995;9:464–9.
13. Fivush B.A., Jabs K., Neu A.M., . Chronic renal insufficiency in children and adolescents: the 1996 annual report of NAPRTCS. North American Pediatric Renal Transplant Cooperative Study. Pediatr Nephrol 1998;12:328–37.
14. Germaine W., Meredith M., Madeleine D., Allison T., Robin T., Fiona M., et al. Health and wealth in children and adolescents with chronic kidney disease (K-CAD study). BMC Public Health. 2014;14(307).
15. McDonald S.P., Craig J.C. Australian and New Zealand Paediatric Nephrology Association. Long-term survival of children with end-stage renal disease. N Engl J Med. 2004;350(26):2654–62.

16. Luciana dos Santos T., Hélady S.P., Henrique N.M., Dilmerson de Oliveira, Rosália Maria Nunes, Henriques Huaira, et al. Impact of social vulnerability on the outcomes of predialysis chronic kidney disease patients in an interdisciplinary center. J Bras Nefrol. 2015;37(1):19-26.
17. Harambat J, Stralen KJv, Harambat J, Kim JJ, Tizard EJ. Epidemiology of chronic kidney disease in children. Pediatr Nephrol. 2012;27:363–73.
18. Kiliś-Pstrusińska K., Medyńska A., Adamczyk P., Bałasz-Chmielewska .I, Grenda R., Kluska-Jóźwiak A., et al. Disease-related social situation in family of children with chronic kidney disease – parents` assessment. A multicentre study. Annals of Agricultural and Environmental Medicine. 2014;21(4):876–81.
19. Safouh H., Fadel F., Essam R., Salah A, Bekhet A. Causes of Chronic Kidney Disease in Egyptian Children. Saudi J Kidney Dis Transpl. 2015;26(4):806-9.
20. Staples A.O., Greenbaum L.A., Smith J.M. Association Between Clinical Risk Factors and Progression of Chronic Kidney Disease in Children. Clinical Journal of the American Society of Nephrology 2010;5(12):2172-9.
21. Olowu W.A., Adefehinti O., Aladekomo T.A. Epidemiology and Clinicopathologic Outcome of Pediatric Chronic Kidney Disease in Nigeria, a Single Cenetr Study. Arab Journal of Nephrology and Transplantation. 2013;6(2):105-13.
22. Cerón A., Fort M.P., Morine C.M., Lou-Meda R., . Chronic kidney disease among children in Guatemala. Rev Panam Salud Publica. 2014;36(6):376-82.
23. Carlos M.O., Raúl H., Miguel A., Elsy G.B., Carlos E.H., Héctor B., et al. Chronic Kidney Disease and Associated Risk Factors in the Bajo Lempa Region of El Salvador: Nefrolempa Study, 2009. MEDICC Review. 2011;13(4):14-22.
24. Chiou Y-Y., Ching-Y- L., Mei-Ju C., Yee-Hsuan Ch., Yi-Fan W., Hsin-Hui W., et al. Etiology and pediatric chronic kidney disease progression: Taiwan Pediatric Renal Collaborative Study. Journal of the Formosan Medical Association. 2015;xx:1-12.
25. Sidy M.S., Dominique D., Lamine G., Charles A.D. Prevalence of Chronic Kidney Disease and Associated Factors in Senegalese Populations: A Community-Based Study in Saint-Louis. 2014;6(5):e19085.