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KNOWLEDGE AND AWARENESS OF SYMPTOMS AND SIGNS, CAUSES AND TREATMENT OF CHRONIC KIDNEY DISEASE IN CHILDREN

Raghda A. Sultan[1], Osama Y. Safder[2], Randa A. Sultan[1], Wed M. Alogaibi[1], Lujain S. Al-rabghi[1], Haifa J. Idrees[1], Ahad A. Alsulmi[1], Aisha S. Aljohani[1], Maram M. AlAteeq[1], Waad M. AlQulayti[1].

[1]King Abdulaziz University, Jeddah, Saudi Arabia, Postal code : 214141.
[2]Department of Pediatrics, Pediatric Nephrology Unit, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia, Postal code : 214141.

Abstract

Objectives: *Chronic kidney disease (CKD) is a global public health problem. its an overwhelming illness in children with many complications and increased morbidity and mortality. This study aimed to determine the knowledge of pediatric CKD, its risk factors, manifestation, and treatment in the general population in Saudi Arabia.*

Methods: *In this cross-sectional study, awareness of CKD in children was assessed in 415 participants using a validated survey, between May and October 2017 in Saudi Arabia. Data were collected through an online form that was randomly distributed.*

Results: *data showed that; 76.1% had knowledge about the disease; 64.6%, causes; 51.3%, symptoms and signs; and 80.2%, treatment. Both males and females showed knowledge with no statistically significant difference. Older people in the sample demonstrated significantly higher level of knowledge about the disease than younger people ($p<0.015$). The mean score differences between those who knew about CKD versus those who did not ($p<0.001$) were also statistically significant. Thus, not all participants had sufficient knowledge about CKD in children.*

Conclusions: *our study showed that not all participants have sufficient knowledge about CKD in children. Therefore, Educational programs, public national campaigns targeting young audience and screening programs for children at risk of developing CKD are highly recommended.*

Keywords: *Awareness, Children, Chronic Kidney Disease, Kidney, Knowledge*

Corresponding author:

OY Safder, SABP

Department of Pediatrics, Pediatric Nephrology Unit, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia
Telephone: +966505620849
Email: safderosama@hotmail.com
Website: https://osafder.kau.edu.sa
P.O. Box: 14071

QR code

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INTRODUCTION:

Chronic kidney disease (CKD) has been recognized as a global health problem worldwide in the last few decades, it is an overwhelming illness in children, and its burden on the healthcare system has been increasing .[1,2] There has been a marked rise in the prevalence and incidence in Saudi Arabia among adults[3] . However, studies on the prevalence of CKD among children are lacking. From the limited data, a cross-sectional study was conducted in Arar in 2016 to determine the risk factors associated with CKD in children, the study showed that CKD was associated with some sociodemographic characteristics, such as parents' consanguinity, family history, and family income, while other factors (age, sex, birth order, mother's age, and exposure to passive smoking) had no significant effect on CKD [4] . Moreover, a retrospective study was conducted in Asir between June 1990 and June 1995 to determine the incidence and causes of chronic renal failure (CRF), the study results revealed a mean annual incidence of CRF of 15.6 per million and of end-stage renal failure (ESRF) of 9.2 per million children, the results found that the incidence of ESRF is higher in the Asir region than in others, and congenital anomalies of the urinary system constitute the most common cause of CRF [5]. Another study was conducted at Riyadh Military Hospital to determine the incidence of CRF and to identify its common causes, the study period extended for 14 years (1989–2002), the mean annual incidence of CRF was 7.14%, Malformation was the dominant cause and included urinary tract anomalies (45.3%) [6]. A study in the western area of Saudi Arabia showed that the CRF profile is similar to other parts with a predominance of congenital causes [7]. Epidemiological data on the disease burden, the associated risk factors, and awareness among the general population are very limited.

CKD in children has many effects on the child, family, and the hospitals owing to increased hospitalization rate [8]. The complications not only affect the health of the patient during childhood but also have an impact in adulthood. This impact is often underrecognized but should not be neglected. Moreover, CKD has a great psychosocial impact, both on the patient and the patients' family[9] .he parents not only have to fulfill the role of parents but also take on many tasks that are normally associated with nurses and doctors. Patients with CKD face lifelong increased morbidity and mortality and decreased quality of life [10]. Growth impairment is a major complication of CKD and can lead to significant height stunting and disproportionate growth failure [11,12]. The children are at increased risk of cardiovascular diseases, bone diseases, central nervous system manifestations, and progression to renal failure [8,10,12].

To address the lack of information regarding general knowledge of CKD in Saudi Arabia, this study aimed to assess the general population regarding knowledge and awareness of symptoms and signs, causes, and treatment of CKD in children.

The main objectives of this research were to evaluate the knowledge of CKD in pediatric patients, its signs and symptoms, causes, and treatments and to understand the factors affecting the level of awareness among Saudi population.

MATERIALS AND METHODS:

Study design

This was a cross-sectional study conducted in Saudi Arabia between May and October 2017. The study protocol was approved by the biomedical ethics unit in King Abdulaziz University in Jeddah, reference number: 231-17. Data were collected through an online Google form, alpha error was reduced by randomly distributing the questionnaire, participants signed the consent before filling in.

The questionnaire was divided into four different sections:

Demographic data

This included questions on age, sex, social status, and city where the respondent is living and questions about knowing a child with CKD, etc.

2. General knowledge and risk factors of CKD

This was designed to test knowledge about function of the kidney and definition and causes of CKD.

3. Knowledge of symptoms and sign of CKD

This was designed to assess level of recognition of signs and symptoms.

4. Treatment options

This included questions about definitive treatment and medications that are high risk for the progression of CKD.

The questions were developed with a pediatric nephrologist and were each presented on a 5-point scale (strongly agree, agree, I do not know, disagree, strongly disagree). It was in Arabic. The questionnaire was valid and reliable.

The questionnaire was randomly distributed online, and the participants were from different cities of Saudi Arabia.

Saudi Arabian adolescents and adults were included. Participants were excluded if they were medical students or worked in healthcare fields.

Sample size

The sample size was 385 participants. It was calculated using the Raosoft sample size calculator[13], with a 95% confidence interval (95% CI). We collected data from 415 participants.

Statistical analysis

In the present study, the analysis was performed with 95% confidence interval using Statistical Package for Social Science (SPSS), version 20 (IBM Corp., Armonk, NY, USA). Categorical variables were presented as frequencies and percentages. Continuous variables were presented as mean ± standard deviation. All CKD knowledge-related questions had 5 possible Likert scale responses: 5 points for "strongly agree," 4 points for "agree," 3 points for "I don't know, "2 points for "disagree," and 1 point for "strongly disagree." All values from the CKD knowledge-related Likert scale questions were added, and then mean ± SD was calculated to obtain the overall knowledge level. Awareness level regarding the clinical features and treatment of CKD was calculated in the same way. The means of these knowledge scores were compared across the demographic variables using independent sample t-test (for dichotomous variables) and one-way analysis of variance (ANOVA) for the variables with >2 responses. All the questionnaires included in this study were properly filled; therefore, there were no missing data, and missing data management was not required.

Validity test of the questionnaire

Using SPSS inter-item Pearson correlation, all parts had statistically significant correlation ($p<0.05$). Moreover, all parts of the scale were highly significantly correlated to the total sum of the scale $p<0.0005$, which means the scale is valid and had internal consistency (Supplementary text S1).

Reliability test

SPSS Cronbach's alpha coefficient was calculated for all parts and for the total scale, and it showed good to excellent consistency (0.8, 0.9). The total scale showed excellent consistency with Cronbach's alpha *= 0.93* (Supplementary text S2).

Weighted mean level was determined for each item using the 5-point Likert scale index (Table 1)

Table 1: 5-point Likert scale

Weighted mean	Weighted mean level
1.00–1.79	No knowledge
1.80–2.59	Poor knowledge
2.60–3.39	Moderate knowledge
3.40–4.19	Good knowledge
4.20–5.00	Excellent knowledge

RESULTS:

Data were collected from 480 participants. Sixty-five (13.5%) participants were excluded as they were medical students or worked in the health fields. Among the remaining 415 participants, most participants were between 31–50 years (44.3%), and the least were >50 years (2.9%). Women were a strong majority (89.4%), and the majority were married (61.2%). More than half of the respondents had children (55.2%), and more than one-third (36.4%) had three or fewer children. Almost two-thirds (62.4%) of the respondents had a university degree. About 95.9% of study participants were citizens, 32.0% were students, and 32.3% were unemployed. Approximately 63.4% of the respondents had average monthly income of <10,000 SR. Almost two-thirds (64.3%) of the respondents were not aware of CKD in children. Those who were aware of CKD had previously heard about it from various sources like the internet (13.3%), family and friends (11.8%), health campaign (7.5%), and radio and TV (6.5%). Only 4.8% of the respondents knew a child with CKD. Table 2 shows the baseline characteristics of all respondents. The mean score differences between those who were aware of CKD versus those who were not (F 8.636, t 4.658, 95% CI 0.259–0.106, p <0.001) were also statistically significant. The mean score differences across other demographic characteristics were not statistically significant. Knowledge score of CKD treatment was also statistically different between the respondents who knew of CKD in children versus others (F 4.822, t 3.488, 95% CI 0.251–0.069, p <0.001). A significant difference was found in the mean score of CKD clinical feature awareness between the respondents who were aware of CKD in children and the respondents who were not (F 3.124, t 4.134, 95% CI 0.289–0.103, p <0.001). Table 3 shows the mean awareness scores about clinical features and treatment of CKD among participants. Older people in the sample demonstrated significantly higher level of knowledge about the disease than younger people (p .015).

Table 2: Baseline characteristics of all respondents presented as frequencies and percentages. The mean knowledge score of CKD for each baseline characteristic and comparison of these means by independent samples t-test (for dichotomous variables) or one-way analysis of variance (for the variables having >2 outcomes) (n = 415)

Characteristics	N	%	Mean ± SD knowledge score	p-value
Age in years				.801
<20	70	16.9	3.63 ± 0.37	
20–30	149	35.9	3.61 ± 0.38	
31–50	184	44.3	3.66 ± 0.41	
>50	12	2.9	3.65 ± 0.40	
Sex				.513
Male	44	10.6	3.67 ± 0.46	
Female	371	89.4	3.63 ± 0.38	
Marital status				.099
Single	161	38.8	3.60 ± 0.38	
Married	254	61.2	3.67 ± 0.40	
Have children				.107
Yes	229	55.2	3.67 ± 0.41	
No	186	44.8	3.60 ± 0.03	
No. of children				.822
1 to 3	151	36.4	3.62 ± 0.38	
3 to 6	70	16.9	3.65 ± 0.37	
More than 6	4	1.0	3.57 ± 0.29	

Level of education				.764
Below high school	17	4.1	3.73 ± 0.52	
High school	109	26.3	3.63 ± 0.41	
University	259	62.4	3.63 ± 0.38	
Higher studies (e.g., PhD)	30	7.2	3.65 ± 0.36	
Occupation				.318
Student	133	32.0	3.60 ± 0.37	
Government job	101	24.3	3.69 ± 0.41	
Private job	47	11.3	3.67 ± 0.46	
Unemployed	134	32.3	3.63 ± 0.37	
Income				.478
<10000 SR	263	63.4	3.62 ± 0.39	
10000–20000 SR	123	29.6	3.66 ± 0.39	
30000–40000 SR	14	3.4	3.76 ± 0.46	
> 40000 SR	115	3.6	3.65 ± 0.40	
Did you ever hear of CKD in children?				<.001
Yes	148	35.7	3.75 ± 0.42	
No	267	64.3	3.57 ± 0.36	
Source of information about CKD in children				.164
Family and friends				
Radio and TV	49	11.8	3.63 ± 0.39	
Health Campaign	27	6.5	3.76 ± 0.46	
Internet	31	7.5	3.80 ± 0.43	
	55	13.3	3.62 ± 0.42	
Do you know a child with CKD?				.314
Yes	20	4.8	3.72 ± 0.43	
No	395	95.2	3.63 ± 0.39	

CKD, chronic kidney disease; SD, standard deviation

Table 3: Mean awareness scores about clinical features and treatment of CKD among all respondents and comparison of these means by independent samples t-test (for dichotomous variables) or one-way analysis of variance (for the variables having >2 outcomes) (n = 415)

Characteristics	Mean ± SD awareness score about clinical features of CKD	p-value	Mean ± SD awareness score about treatment of CKD	p-value
Age in years		.662		.741
<20	3.51 ± 0.48		3.77 ± 0.44	
20–30	3.43 ± 0.44		3.75 ± 0.45	
31–50	3.47 ± 0.50		3.80 ± 0.46	
> 50	3.47 ± 0.47		3.66 ± 0.49	
Sex		.977		.251
Male	3.46 ± 0.56		3.84 ± 0.51	
Female	3.47 ± 0.46		3.76 ± 0.45	
Marital status		.949		.070
Single	3.46 ± 0.47		3.71 ± 0.45	
Married	3.47 ± 0.47		3.80 ± 0.46	

Have children		.983		.242
Yes	3.47 ± 0.50		3.79 ± 0.45	
No	3.47 ± 0.44		3.74 ± 0.45	
No. of children		.546		.883
1–3	3.43 ± 0.46		3.75 ± 0.43	
3–6	3.47 ± 0.47		3.74 ± 0.43	
>6	3.22 ± 0.29		3.85 ± 0.68	
Level of education		.834		.760
Below high school	3.55 ± 0.54		3.87 ± 0.57	
High school	3.46 ± 0.46		3.78 ± 0.48	
University	3.47 ± 0.48		3.76 ± 0.44	
Higher studies (e.g., PhD)	3.42 ± 0.43		3.79 ± 0.43	
			3.77 ± 0.02	
Occupation		.423		.278
Student	3.46 ± 0.47		3.71 ± 0.44	
Government job	3.53 ± 0.49		3.80 ± 0.45	
Private job	3.46 ± 0.50		3.84 ± 0.52	
Unemployed	3.46 ± 0.47		3.78 ± 0.44	
Income		.617		.414
<10000 SR	3.44 ± 0.46		3.75 ± 0.45	
10000–20000 SR	3.50 ± 0.48		3.77 ± 0.45	
30000–40000 SR	3.56 ± 0.51		3.90 ± 0.56	
>40000 SR	3.45 ± 0.55		3.90 ± 0.45	
Did you ever hear of CKD in children?		<.001		.001
Yes	3.59 ± 0.50		3.87 ± 0.48	
No	3.40 ± 0.44		3.71 ± 0.43	
Source of information about CKD in children		.253		.444
Family and friends	3.43 + 0.47		3.75 ± 0.44	
Radio and TV	3.61 ± 0.57		3.90 ± 0.49	
Health Campaign	3.62 ± 0.53		3.89 ± 0.42	
Internet	3.48 ± 0.48		3.80 ± 0.49	
Do you know a child with CKD?		.762		.089
Yes				
No	3.50 ± 0.58		3.93 ± 0.49	
	3.46 ± 0.47		3.76 ± 0.45	

CKD, chronic kidney disease; SD, standard deviation

Table 4 shows the reference mean values for knowledge level measurement. None of the participants had “no knowledge” about CKD in children. Overall, 8.7% of the participants had excellent knowledge, 64.1% had good knowledge, 26.7% had a moderate knowledge, and 0.5% had little knowledge regarding CKD in children. When only the knowledge about sign and symptoms of CKD was measured, 8.0% had excellent knowledge, 43.4% had good knowledge, 46.7% had a moderate knowledge, and 1.9% had little knowledge. Knowledge level on CKD treatment was excellent for 19.0%, good for 61.2%, and moderate for the remaining 19.8% (Figure 1).

Table 4: Reference values for knowledge level measurement in this study

Mean	Knowledge level
1.00–1.79	No knowledge
1.80–2.59	Poor knowledge
2.60–3.39	Moderate knowledge
3.40–4.19	Good knowledge
4.20–5.00	Excellent knowledge

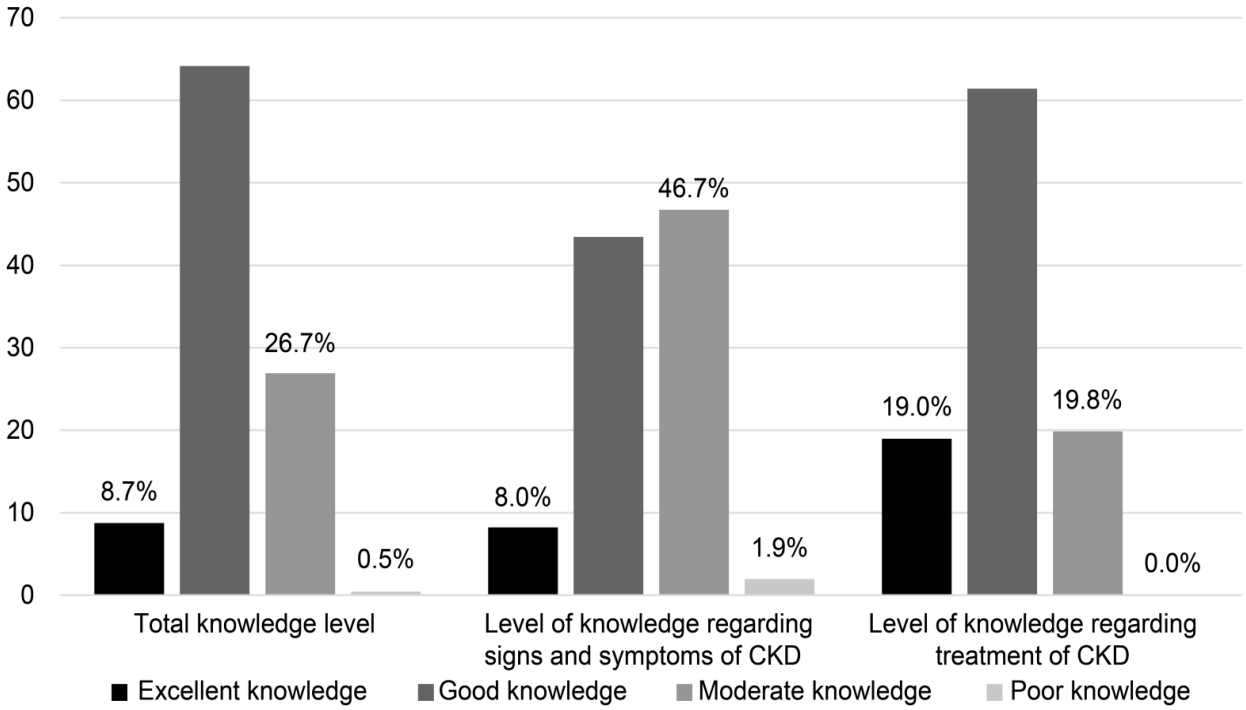

Figure 1: Percentage of respondents who were very aware, aware, moderately aware, and less aware about CKD in terms of total knowledge, knowledge about clinical features, and knowledge about treatment (n = 415)

DISCUSSION:

This study found that awareness of CKD in children in the Saudi population was generally at an intermediate level. CKD has become a worldwide significant health problem[1,2]. Its complications can lead to increased morbidity and mortality[10]. Awareness of the general population of CKD is essential for making an early diagnosis, determine reversible causes of progression, and predicting prognoses[14]. We found that demographic factors play a significant role. Older people in the sample demonstrated significantly higher level of knowledge about the disease, its caus-

es, and signs and symptoms than younger people. This might be due to lack of campaigns that target young audiences and educational programs about CKD in schools in Saudi Arabia. In Malaysia, a study of patients attending an outpatient clinic found that the mean knowledge score of older participants was significantly lower than that of the age groups of 21–40 years[15]. In the current study, most of the participants (67.1%) had good knowledge about CKD in children. This outcome is in contrast to that a study by Oluyombo R et al., which found a low level of knowledge (33.7%) in a community of southwest Nigeria[16]. Children with congenital anomalies of the kidney and urinary tract, prematurity and low birth weight, and hereditary disorders such as polycystic kidney disease are at risk of developing CKD[17,18]. In the United States, the registry of the North American Pediatric Renal Trials and Collaborative Studies (NAPRTCS) has collected data on the early stages of CKD in children since 1994[19]. It includes >7,000 children aged under 21 years, providing a large source of information on the etiology of CKD in childhood. In a NAPRTCS report, congenital causes, including congenital anomalies of the kidney and urinary tract (CAKUT) (48%) and hereditary nephropathies (10%), were the most common[20]. Our results showed that participants were aware of the causes of CKD in children with no significant differences by sex, education level, income, or knowing a child with CKD. Similarly, a study performed in Iran showed no significant relationship between sociodemographic features and the knowledge of risk factors for CKD[21]. Our data showed that regarding the awareness of causes, more than one-third of the participants agreed that heredity, kidney stones, and urinary tract infection could be causes. Concerning birth defects, nephrotic syndrome, systemic disease, trauma, and autoimmune disease, most participants answered, "I don't know." However, congenital anomalies are the most common cause of CKD in Saudi Arabia[5,6,7].

Symptoms and signs of CKD appear when the kidney function is severely compromised. It is usually asymptomatic early in the course of the disease[22]. About 51.3% of participants were aware of the symptoms and signs of CKD, and 48.7% were not aware. A study was conducted by Wright et al. on patients with CKD. Their results showed that patients had limited knowledge of symptoms of CKD[23]. Progression of CKD can be slowed by early detection, treating hypertension, maintaining optimal glycemic control in patients with diabetes, eating a low protein diet, treating dyslipidemia, losing weight, and managing anemia[24,25]. This was agreed upon by most of the participants, as the data showed that 80.2% were aware of these factors. Definitive treatment of end-stage CKD is kidney transplantation, which becomes necessary to sustain life[26]. Participants had no knowledge of the definitive treatment and whether a donor who is a relative is better. However, the majority strongly agreed that a living donor is the best donor. While waiting for a kidney transplant, dialysis is often necessary (peritoneal dialysis or hemodialysis). Studies have shown that children on peritoneal dialysis are more likely to have normal social interactions, better school attendance, more flexibility of treatment, and fewer side effects than patients on hemodialysis[27]. About 84.6% of participants had no knowledge of whether peritoneal dialysis is the best dialysis modality for social life. Consulting the doctor to administer the child antibiotic for fever or vitamin supplement was strongly agreed on by most of the participants. Using it without doctors' advice can be harmful. Avoiding nephrotoxic medication like non-steroidal anti-inflammatory drugs is important as it can lead to further dysfunction of the kidney[28]. Most of the participants had no knowledge of drugs that do not affect the kidneys. In contrast to our research, Wright et al. (2013) study showed that 72% of their participants who were patients with CKD were aware of what medications they should avoid. Moreover, 74% understood options for kidney failure, and about 84% were aware of medications important to kidney health[23].

This study is important because knowing the symptoms and signs of CKD will help identify affected individuals, possibly resulting in the early institution of effective therapy, slow progression of the disease and improvement of growth, prevention of possible complications and reduction of bad outcomes, and ultimately improvement in the quality of life.

The findings of our study have an important implication. There are knowledge gaps on CKD in our population, more so among the younger population. Hence, there is a need for a more targeted approach to increase awareness and knowledge on CKD. Therefore, our study suggests that organizing health campaigns is important not only among those at risk of developing CKD but also the general population at every level of society. Further, media plays an important role in ensuring effective dissemination of information among the public. This research framework can act as a stimulus for further research in this area.

This study has some limitations. The survey was distributed online; therefore, possible selection bias cannot be ruled out. The small number of male partici-

pants in our study may not be representative of the whole male population in Saudi Arabia. This study is limited to the general population of Saudi Arabia and cannot be generalized to other populations.

CONCLUSION:

In conclusion, our study showed that not all participants have good knowledge about CKD in children. Therefore, educational programs and public national campaigns are highly recommended to increase the public awareness and should target a young audience. Further studies are advisable.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declares that there is no conflict of interest regarding the publication of this paper.

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