

Awareness among Saudi Parents about the Kidney Diseases among Children

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ABSTRACT

Background: Kidney diseases among children are serious health issues which have fatal future drawbacks on their health. Public awareness about the kidney problems among children is the main pillar for proper and effective management.

Aim: To evaluate Saudi parents' awareness and attitude about the children's kidneys health problems in three big Saudi cities.

Methods: The current study is a questionnaire-based cross sectional study, included a random sample of Saudi parents from three big cities (Riyadh, Tabouk and Arar). The questionnaire's question covered demographic data, awareness, and attitude about the pediatric nephrology.

Results: The questionnaire was completed by 1489 parents. Sufficient knowledge was shown in 1195 (80.3%) participants about the pediatric kidney problems. The multivariate regression analysis showed that ages, employment and level of education had significant effect ($p=0.006$, <0.0001 , 0.003 , and 0.001 respectively) on the knowledge scores. Around 95% of participants thought that pediatric kidney diseases are serious health problems. Participants revealed that hematuria (88.9%) was the most stressing symptoms of pediatric kidney manifestations. Family and friends' experience was the most common sources of participants' knowledge (57.4%).

Conclusions: The current study had showed generally accepted level of awareness among Saudi parents about the kidney problems among children. Greater efforts should be planned by the healthcare provider to give a better correct knowledge to the public.

MeSH words: Public awareness, kidney diseases, pediatric nephrology, hematuria.

INTRODUCTION

Awareness of the public about the diseases and their main symptoms and when to seek the medical advice is the main pillar for effective mangment of disesaes with the best expected outcomes ¹. To effectively manage the kidney problems among children, we must focus on educating the public as well as continue to investigate the pathophysiology of pediatric kidney disease.

The kidneys are two bean-shaped organs, each about the size of a fist. They are located just below the rib cage, one on each side of the spine ². Every day, the two kidneys filter about 120 to 150 quarts of blood to produce about 1 to 2 quarts of urine, composed of wastes and extra fluid. Children produce less urine than adults and the amount produced depends on their age ³. Each kidney is made up of about a million filtering units called nephrons. Each nephron filters a small amount of blood. The nephron includes a filter, called a glomerulus, and a tubule. The nephrons work through a two-step process. The glomerulus lets fluid and waste products pass through it; however, it prevents blood cells and large molecules, mostly proteins, from passing ⁴. The filtered fluid then passes through the tubule, which changes the fluid by sending needed minerals back to the bloodstream and removing wastes. The final product becomes urine. The kidneys also control the level of minerals such as sodium, phosphorus, and potassium in the body, and produce an important hormone to prevent anemia⁵.

Kidney disease can affect children in various ways, ranging from treatable disorders without long-term consequences to life-threatening conditions⁶. Acute kidney disease develops suddenly, lasts a short time, and can be serious with long-lasting consequences or may go away

completely once the underlying cause has been treated⁷. Chronic kidney disease (CKD) does not go away with treatment and tends to get worse over time. CKD eventually leads to kidney failure, described as end-stage kidney disease or end stage renal disease when treated with a kidney transplant or blood-filtering treatments called dialysis⁸.

During the first four years of life, birth defects and hereditary diseases are the leading causes of renal failure. While, hereditary diseases, nephrotic syndrome, and systemic diseases are the most common causes of renal failiure in children aged from 5 to 14 years. However, glomerular lesions are the main cuases of renal failiure among children aged from 15 to 19 years old⁹.

Renal diseases among children are mainfested with a wide range of symptoms including, polyuria, oliguria, dysuria or hematuria and dark colored urine. Also kidney diseases among chidren may be represented by persistent anemia not responding to other medications or hypertension ¹⁰. Awareness of parents with these wide range of mainfestations is the triggering point to seek the medical advice in the proper time. Hence the mangment will be immediate and approrprait with the best outcome. Hence, this study was conducted to estimate the awareness, attitude and behavior of Saudi parents regarding kidney diseases among children.

MATERIAL AND METHOD

Ethical issues: The study design was approved by the Northern Border University local committee of bioethics. All participants had given informed consent after explaining the aim of the study to them. Confidentiality was considered in data collection and analysis. This study was

conducted in three big cities in Saudi Arabia; Riyadh (the capital city of Saudi Arabia), Tabouk (the capital city of the Tabouk Region (Principality) in north western Saudi Arabia), and Arar (the capital city of the Northern Border Region) (Principality) with estimated population size in the three cities as around 534,893170000 people ¹¹.

Study design: This is a questionnaire based, descriptive, and cross sectional study, included a stratified sample of Saudi male and female parents from three big Saudi cities. The predesigned questionnaire contained four parts. The first part covered the demographic data including age, gender, level of education, employment, and past history of kidney diseases among their families' members. The second part contained 28 true, false, or I do not know questions about anatomy and physiology of the kidneys (10 questions), risk factors for kidney diseases and methods for kidney protection (10 questions) and kidney diseases among children and their main symptoms (8 questions). The third part considered questions regarding the attitude of the parents about kidney diseases among children and the common nephrology related symptoms among children. Also the attitude of the participants about the available pediatric nephrology health services was questioned. Final questions asked the parents enrolled in the study about their willing to attend scientific meeting about pediatric kidney diseases and about their main sources of knowledge regarding pediatric kidney problems.

The questionnaire was validated by Community Medicine Department of Northern Border University. The questionnaire was designed in Arabic language and the data collector had helped the illiterate parents to understand all questions without any confusion. A volunteer team of Arabic speaking medical (MBBS) students, after special training were participated in data collection.

Eight hundred questionnaire were randomly distributed in each city. Then participants' responses were collected. Only complete forms were considered. For more robust data, Questionnaires with the same answers for all questions were excluded.

Data Analysis: The current Saudi Arabia population was reported to be 33,931,770 on February 2019, based on the latest United Nations estimates with estimated populations in Riyadh, Tabouk and Arar as 4205961, 455450 and 148,540 respectively ¹². Based on the number of people living in the three cities and at 95% level of confidence with an assumed precession of 5%, the minimum sample size required was 385, 384 and 383 from Riyadh, Tabouk and Arar, respectively. For questions pertaining to knowledge, persons who gave correct answers was scored as one, while persons who answered incorrectly were scored as zero. Those having scored below 14 of 28 were considered as having "insufficient knowledge". All the variables were summarized and reported across the study using descriptive statistics. Comparisons were conducted using chi-square for binary variables. P-value less than 0.05 was considered as statistically significant.

RESULTS

A total number of 1489 parents have returned completed questionnaire forms to the current study data collectors. There were 517 participants enrolled from Riyadh (response rate 64.6%) and 514 participants from Tabouk (response rate 64.25%), while only 458 parents from Arar (response rate 57.25%) have completed the questionnaire. Their ages ranged from 21- 64 years with mean age 40.3±16.5 years. Demographic data of the participants are shown in Table 1.

The knowledge overall score among the participants regarding children's kidney problem was 17±18 out of 28 with a wide range of scores from 5-28. The scores for the different questionnaire questions are shown in table (2) with average number of right answers for all questions as 895.9±225.9. According to the overall scores of all sections, 1195 (80.3%) showed sufficient knowledge about the pediatric kidney problems. Participants showed the significantly higher percent of sufficient knowledge (score>50% for the total score of every questions section) in Questions regarding kidney protection and risk factor for kidney diseases as shown in figure (1). There was significant difference in knowledge over all scores of the participants in relation to their cities, ages, and educational levels, employment and family history of kidney problems (Table 3). As variables were overlapping, the multivariate multiple regression analysis model was conducted and its results showed that only ages, employment, level of education, and positive family history of kidney diseases had significant effect on the overall knowledge scores (Table 4).

Regarding participant's attitude towards kidney disease among children, 1405 (94.4%) thought that pediatric kidney diseases are serious health problem which can affect the children's future. Participants revealed that hematuria was the most stressing symptoms of pediatric kidney manifestations followed by the fever while frequency was reported as the least stressing according to the participants' opinion (Table 5). Only 845 (65.7%) participants showed willingness to attend any organized future educational session focused on the children's kidney problems. Regarding parents' attitude toward pediatric nephrology available healthcare services, 935 (62.8%) were satisfied, 213 (14.3%) unsatisfied, while 341 (22.9%) were neutral or has no experience about the available services.

Unfortunately, Limited numbers of participants [326 (21.9%)] reported that they have visited the pediatrician for checkup investigation about their kids' kidney functions. Interestingly, about 4 fifths of them were from the group who gave a past history of kidney disease among their relatives or kids. Family and friends' experience was reported to be the most common sources of knowledge about children's kidney problems [855 (57.4%)] participants, followed by the personal experiences [260(17.5%)], the media [216(14.5%)] and finally the organized awareness educational sessions [158(10.6%)].

Fig. 1: The overall scores according to the different sections of the questions of the questions

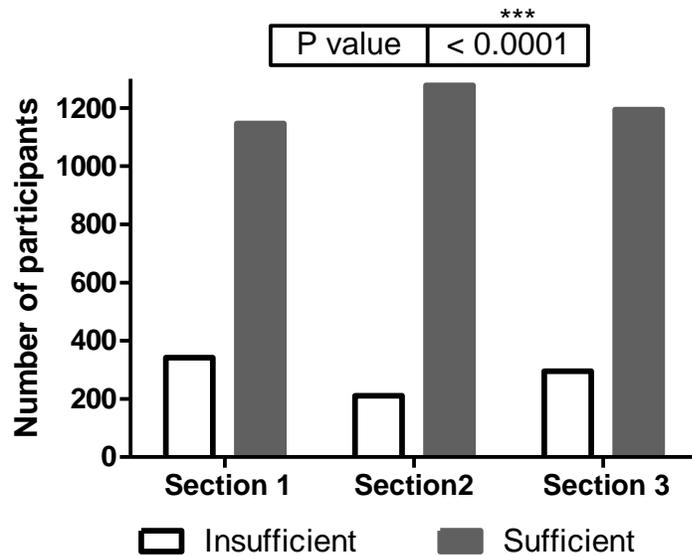


Table 1: Demographic data of the participants

Variables	Cities		Riyadh		Tabouk		Arar		Totals 1489	
			n	%	n	%	n	%	n	%
Gender	Males		312	35.7	287	32.8	276	31.5	875	100.0
	females		205	33.4	227	37.0	182	29.6	614	100.0
Age (years)	<30		222	35.4	219	34.9	187	29.8	628	100.0
	30-50		227	32.8	239	34.5	226	32.7	692	100.0
	>50		68	40.2	56	33.1	45	26.6	169	100.0
Education	Low education		453	35.2	446	34.6	389	30.2	1288	100.0
	High education		64	31.8	68	33.8	69	34.3	201	100.0
Employment	Medical sector		78	33.9	83	36.1	69	30.0	230	100.0
	Education sector		125	30.0	166	39.8	126	30.2	417	100.0
	Governmental employee		234	41.1	167	29.3	168	29.5	569	100.0
	Private sector		53	37.6	42	29.8	46	32.6	141	100.0
	Not working		27	20.5	56	42.4	49	37.1	132	100.0
FH of renal problems	Positive		102	38.3	89	33.5	75	28.2	266	100.0
	Negative		415	33.9	425	34.8	383	31.3	1223	100.0

Table 2:.. Number of the right answers for each knowledge question in the questionnaire.

Knowledge question	Correct answers	
	n	%
kidneys present in abdominal cavity.	1365	91.7
The size of the kidney is the size of the closed hand fist.	943	63.3
Both kidneys are not equal in size	856	57.5
Kidneys are responsible for the purification of blood from the toxins	1278	85.8
Kidneys help in the purification of blood from the metabolism wastes.	956	64.2
Kidney have a role in the control of sodium and potassium in blood.	785	52.7
Kidneys play a role in regulation of acid base balance	658	44.2
Kidneys help in regulation of the blood pressure	1134	76.2
Kidney plays an important role in the formation of active vitamin D.	758	50.9
Kidneys play an important role in the formation of red blood cells.	856	57.5
Frequent drinking water maintains kidney function.	1265	85.0
High blood pressure affects badly the kidneys.	1087	73.0
Diabetes may disturb kidney functions kidneys.	1253	84.2
Systemic lupus erythematosus can affect the kidney functions.	746	50.1
Some foods and fruits may help to form kidney stones.	956	64.2
Excessive use of antibiotics in children may lead to renal failure.	856	57.5
Excessive use of analgesics in children may lead to renal failure.	695	46.7
Bacterial throat infections may affect kidney functions	735	49.4
Some kidney disease may be inherited and run in certain families	758	50.9
Neglected childhood kidney diseases may lead to adulthood renal failure	1256	84.4

The most common types of kidney stones are calcium oxalate.	576	38.7
Urinary tract infections are more common in children than adults.	756	50.8
Urinary tract infections are more common among females	637	42.8
Bad urine odour from signs of urinary tract infections in children.	839	56.3
Chronic renal failures mean irreversibly impaired kidney functions	940	63.1
The swollen child's eye lid in the morning may be due to kidney diseases.	739	49.6
The swollen child's feet in the evening may be caused by kidney diseases.	597	40.1
Refractory anemias may be caused by renal diseases	806	54.1

Table 3: Univariate analysis of the effect of different variables of the overall scores of knowledge.

	Variable	Insufficient knowledge	Sufficient knowledge	P-value
Cities	Riyadh	86	431	9.936, 2 0.007**
	Tabouk	96	418	
	Arar	112	346	
Gender	Males	179	696	0.6795, 1 0.409
	females	115	499	
Age (years)	<30	112	516	442.1, 2 <0.0001****
	30-50	49	643	
	>50	133	36	
Education	Low education	211	1077	68.09, 1 <0.0001****
	High education	83	118	
Employment	Medical sector	6	224	310.5, 4 <0.0001****
	Education sector	56	361	
	Governmental employee	76	493	
	Private sector	85	56	
	Not working	71	61	
FH of renal problems	Positive	40	226	4.528, 1 0.033*
	Negative	254	969	

Table 4: The multivariate analysis of the effect of the different variables on the overall scores of knowledge about children's kidney problems among participants.

Variable	p-value	Odd ratio	95% Odd's ratio	
			Min	Max
City	0.243	1.023	0.675	2.165
Gender	0.321	0.768	0.324	4.352
Age	0.006**	1.765	1.436	2.132
Education	0.003**	1.856	1.536	2.012
Employment	<0.0001***	1.522	1.28	1.768
FH of renal problems	0.0013**	1.231	0.975	2.065

Table 5: The attitude of the patents regarding the manifestations of children's kidney problems.

In your opinion, what is the most stressing symptom/s indicating urgent medical consultation?	
Hematuria	1324 (88.9%)
Oliguria	745 (50%)
Dysuria	534 (35.9%)
Eye puffiness	454 (30.5%)
Ankle edema	465 (31.2%)
Fever	1132 (76%)
Frequency	276 (18.5%)
Bad odour of the urine	326 (21.9%)
Loin pain	956 (64.2%)

DISCUSSION

To the best of our knowledge, the current study is the first study to evaluate the parents' awareness and attitude regarding their children's kidney problems. The study was conducted in three Saudi cities with a total number of participants of 1489 parents. According to the overall scores of all sections, 1195 (80.3%) showed sufficient knowledge about the pediatric kidney problems. Participants showed the significantly higher percent of sufficient knowledge in questions related to kidney protection and risk factor for kidney diseases. The multivariate multiple regression analysis model showed that

only ages, employment and level of education had significant effect on the overall knowledge scores. Around 95% of participants thought that pediatric kidney diseases are serious health problem which can affect the children's future. Participants revealed that hematuria was the most stressing symptoms of pediatric kidney manifestations followed by the fever while frequency was reported as the least stressing according to the participants' opinion. However only 20% were keen for checkup investigations for their kids' kidney diseases. Only around 63% of parents were satisfied about the available healthcare services. Family and friends' experience was the most common

sources of knowledge about children's kidney problems, followed by the personal experiences.

The overall score among Saudi parents was highly acceptable as around 80% of the Saudi parents showed score $\geq 50\%$. This level of knowledge is higher than what was reported about the level of knowledge about eye diseases in Tabouk about 50%¹³ and breast cancer among Riyadh women about 54%¹⁴. While 75% of Riyadh population showed high knowledge score regarding diabetes mellitus¹⁵. This wide range of score may be due to the difference in the prevalence of the different diseases among Saudi population. As the self, family and friend's experiences are shown to be the leading sources of awareness. This also may reflect high public interest about the kidney diseases among children. In addition, it is well known that children's health problem attracts more attention among parents. So, they will be more keen to get more information about their kids' health issues. Hence their interest may arise from there concept that kidney diseases are serious health problems among children that may affect their future.

More than 90% of participants were about the role of the kidney in wastes removal, while 76% were knew the role of the kidney in blood pressure control and only and 57% were aware about the kidney function in hematopoiesis. Only 50% knew that kidney diseases may be inherited. These levels are higher than what was reported in a previous Nigerian study which investigated the level of awareness about the kidney functions and diseases among the Nigerian adults¹⁶, which reported that only 82.1% were aware of the excretory kidney functions while 36% and 29% were aware of kidneys' role in blood pressure control and hematopoiesis, respectively. While only 25% were aware about the inherited kidney diseases. In the current study, ages, employment, level of education and past or family history of kidney problems had significant effect on the overall knowledge scores about the pediatric kidney diseases. This is in accordance with the previously published data as^{13-15,17}.

Hematuria was the most stressing symptom for the public followed by fever. Hematuria is a serious symptom among children. In most cases, the hematuria is caused by lower urinary tract, about 10% of hematuria is caused by glomerular bleeding¹⁸. Hematuria is serious for children as it means bleeding and blood loss which is serious by itself. In addition, gross hematuria is linked for the public with serious kidney diseases including malignancies. Regarding fevers, it is one of the leading causes that force parents to bring their kids to the clinics¹⁹. It is mainly caused by infection²⁰. Parents thought it is serious as they know that it is serious for the central nervous system and can precipitate seizures²¹. In addition, it may be a sign for serious infections.

Interestingly, around 95% of participants thought that pediatric kidney diseases are serious health problem which can affect the children's future. However only about 20% were keen for periodic checkup for the kidney functions for here kids. It is in line with other Saudi and Jordanian studies, which reported high knowledge among participants, while only around 20% were keen for periodic health examination in 2013^{22,23}. This is an example of controversy between the awareness and behavior.

The current data revealed that family and friends' experience was the most common sources of knowledge about children's kidney problems, followed by the personal experiences. It is in line with other studies that considered the interpersonal communication as the most frequently used source of public awareness and also the most truth table source of information^{13,24}.

A limitation of this study is that, despite the statistically sufficient numbers from the three big cities, all participants were from urban communities, so the results are may not be exactly representative for the awareness in the total Saudi population, owing to lack of equal representation of rural and urban communities. However, most communities in Saudi Arabia are urban with limited number of rural areas (about 16.6% of the total Saudi population as they are expected to be about 16.67% in 2016, according to the World Bank collection of development indicators).

CONCLUSIONS AND RECOMMENDATIONS

The current study had showed generally accepted level of awareness among Saudi parents about the kidney problems among children. However, some issues must be considered as this awareness was not translated to a positive behavior as only one fifth of the participants were keen for periodic checkup for the kidney functions for their kids. Secondly, personal communications were the most common and truth table source of knowledge among parents. This may be a critical point as some time public misconnects about kidney diseases will be the main source of false knowledge which may be difficult to be corrected. Thirdly, Greater efforts should be planned by the healthcare provider to give a better correct knowledge to the public about the kidney diseases among children. Finally, the media should adopt more role in the public awareness campaign about the national health problems.

Conflict of interest: The author declares no conflicts of interest with the published data and results

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REFERENCES

1. Zühlke LJ, Engel ME. The importance of awareness and education in prevention and control of RHD. *Global heart*. 2013;8(3):235-9.
2. Bernhard JC, Isotani S, Matsugasumi T, Duddalwar V, Hung AJ, Suer E, et al. Personalized 3D printed model of kidney and tumor anatomy: a useful tool for patient education. *World journal of urology*. 2016 ;34(3):337-45.
3. Trionfini P, Benigni A, Remuzzi G. MicroRNAs in kidney physiology and disease. *Nature Reviews Nephrology*. 2015 Jan;11(1):23.
4. Alpern RJ, Hebert SC, editors. *Seldin and Giebisch's The Kidney: Physiology & Pathophysiology* 1-2. Elsevier; 2007 Oct 10.
5. Olauson H, Lindberg K, Amin R, Jia T, Wernerson A, Andersson G, Larsson TE. Targeted deletion of Klotho in kidney distal tubule disrupts mineral metabolism. *Journal of*

- the American Society of Nephrology. 2012 Oct 1;23(10):1641-51.
6. Harambat J, Van Stralen KJ, Kim JJ, Tizard EJ. Epidemiology of chronic kidney disease in children. *Pediatric nephrology*. 2012 Mar 1;27(3):363-73.
 7. Zappitelli M, Washburn KK, Arikan AA, Loftis L, Ma Q, Devarajan P, et al.. Urine neutrophil gelatinase-associated lipocalin is an early marker of acute kidney injury in critically ill children: a prospective cohort study. *Critical Care*. 2007 Aug;11(4):R84.
 8. Warady BA, Chadha V. Chronic kidney disease in children: the global perspective. *Pediatric Nephrology*. 2007 Dec 1;22(12):1999-2009.
 9. Furth SL, Cole SR, Moxey-Mims M, Kaskel F, Mak R, Schwartz G, et al. Design and methods of the Chronic Kidney Disease in Children (CKiD) prospective cohort study. *Clinical Journal of the American Society of Nephrology*. 2006 Sep 1;1(5):1006-15.
 10. Schwartz GJ, Furth S, Cole SR, Warady B, Munoz A. Glomerular filtration rate via plasma iohexol disappearance: pilot study for chronic kidney disease in children. *Kidney international*. 2006 Jun 1;69(11):2070-7.
 11. World Population Review Population of Cities in Saudi Arabia (2019). <http://worldpopulationreview.com/countries/saudi-arabia-population/cities/>
 12. Cochran WG. *Sampling techniques*. John Wiley & Sons; 2007 Nov 21.
 13. Al-Lahim WA, Al-Ghofaili RS, Mirghani H, ALBalawi H. Evaluation of Awareness and Attitudes towards Common Eye Diseases among the General Population of Northwestern Saudi Arabia. *The Egyptian Journal of Hospital Medicine* (January 2018). 2018 Jan 7;70(7):1201-8.
 14. Al Otaibi S, Al Harbi M, Al Kahmoas A, Al Qhatani F, Al Mutairi F, Al Mutairi T, et al. General breast cancer awareness among women in Riyadh city. *Asian Pacific journal of cancer prevention: APJCP*. 2017;18(1):159.
 15. Asdaq SM. Knowledge, Attitude, and Practice Regarding Diabetes Mellitus among General Public and Diabetic Patients in Riyadh, Saudi Arabia. *Asian Journal of Pharmaceutics (AJP): Free full text articles from Asian J Pharm*. 2018 May 14;12(01).
 16. Okwuonu CG, Chukwuonye II, Ogah SO, Abali C, Adejumo OA, et al. Awareness level of kidney functions and diseases among adults in a Nigerian population. *Indian journal of nephrology*. 2015 May;25(3):158.
 17. Huh K, Chung DR, Kim SH, Cho SY, Ha YE, Kang CI, et al. Factors affecting the public awareness and behavior on antibiotic use. *European Journal of Clinical Microbiology & Infectious Diseases*. 2018 Aug 1;37(8):1547-52.
 18. Mariani AJ, Mariani MC, Macchioni C, Stams UK, Hariharan A, Moriera A. The significance of adult hematuria: 1,000 hematuria evaluations including a risk-benefit and cost-effectiveness analysis. *The Journal of urology*. 1989 Feb;141(2):350-5.
 19. Niehues T. The febrile child: diagnosis and treatment. *Deutsches Ärzteblatt International*. 2013 Nov;110(45):764.
 20. Arora R, Mahajan P. Evaluation of child with fever without source: review of literature and update. *Pediatric Clinics*. 2013 Oct 1;60(5):1049-62.
 21. Natsume J, Hamano SI, Iyoda K, Kanemura H, Kubota M, Mimaki M, et al. New guidelines for management of febrile seizures in Japan. *Brain and Development*. 2017 Jan 1;39(1):2-9.
 22. Khalil A, Abdalrahim M. Knowledge, attitudes, and practices towards prevention and early detection of chronic kidney disease. *International nursing review*. 2014 Jun;61(2):237-45.
 23. El Bcheraoui C, Tuffaha M, Daoud F, AlMazroa MA, Al Saeedi M, Memish ZA, Basulaiman M, Al Rabeeah AA, Mokdad AH. Low uptake of periodic health examinations in the Kingdom of Saudi Arabia, 2013. *Journal of family medicine and primary care*. 2015 Jul;4(3):342.
 24. Mertens F, Távora R, Nakano EY, Castilhos ZC. Information sources, awareness and preventive health behaviors in a population at risk of Arsenic exposure: The role of gender and social networks. *PloS one*. 2017 Oct 9;12(10):e0186130.