CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.2554250

Available online at: http://www.iajps.com *Research Article*

SURVEY FOR MODIFIABLE RISK FACTORS OF RENAL DISEASE IN AL-MADINAH AL- MONAWARAH REGION, SAUDI ARABIA

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Abstract:

Background: *A number of modifiable risk factors are associated with increasing prevalence of chronic kidney disease with disease progression in many patients. The key factor for reducing the burden of the disease is the development of Chronic Kidney Disease prevention and control strategies.*

Objectives: *to identify the modifiable risk factors of renal disease in Al-Madinah Al- Monawarah region in Saudi Arabia in order to provide valuable opportunities for effective interventions and reducing the risk of death, end-stage renal disease, or complications of renal dysfunction.*

Methods: *A cross-sectional study was carried out on a convenience sample of 2500 persons from different places in Al-Madinah Al-Monawarah region in Saudi Arabia using a questionnaire included questions on socio-demographic, behavioral factors, medical and health history as family history of CKD, hypertension, diabetes, previous renal stone and recurrent urinary tract infection.*

Results: *Self-reported renal risk factors were identified from each participant. The age of the participants ranged from 15 to above 40 years with more female participants than male. Of the 2500 respondents, 15.1% of them were smokers, 15.3% had difficulty in urination, 76.6% delay going to the bathroom. 15.3% had complained of infections or stones in the urinary tract, 78.2% consume moderate to high amount of salt in their food, 78.8% of them consume high amount of fat. 72.9% of them consume fast food daily to weakly and 28.2% of them consume 2 cups and less of water per days and there is a significant association between gender, age and most of renal modifiable risk factors.*

Conclusion: *A relatively high frequency of modifiable risk factors of renal disease was reported. Attention needs to be paid to the risk factors for chronic kidney disease especially modifiable one. At-risk populations or individuals must be screened and treated early to prevent onset and delay progression if the disease has took place.*

Key words: *Survey, renal disease, modifiable, risk factors, Saudi Arabia.*

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Please cite this article in press Alzahraa almahlawi et al., ***Survey For Modifiable Risk Factors Of Renal Disease In Al-Madinah Al- Monawarah Region, Saudi Arabia.,*** *Indo Am. J. P. Sci, 2019; 06(01).*

INTRODUCTION:

Chronic Kidney Disease (CKD) is a condition in which the kidneys have been damaged and have not worked normally for at least 3 months [1] If left untreated, individuals with CKD may progress to end-stage kidney failure. The early stages of CKD are generally asymptomatic. Therefore, the burden of the disease at these early stages goes largely undetected and difficult to assess [2]. The symptoms only begin to manifest when greater than fifty percent of renal functional mass has been lost. Most patients therefore present late to hospital, usually in the advanced diseased states and in need of salvage dialysis [2]. The prevalence of both acute and chronic renal failure is high in the Arab world. Data available on the exact prevalence of various renal diseases are very limited. Nevertheless, the reported prevalence of chronic renal failure is 80 to 120 per million populations in the Kingdom of Saudi Arabia [3]. Paradoxically, in the Arab world, we have a good opportunity to reduce the incidence of kidney failure both chronic and acute substantially by appropriately chosen models .This is because many of the causes of renal failure are eminently preventable [3]. A number of risk factors are associated with increasing prevalence of chronic kidney disease with disease progression in many patients [4]. Non steroid anti-inflammatory drugs (NSAIDs) have been associated both with acute kidney injury in the general population and with disease progression in those with CKD [5]. One of the important modifiable risk factors is decreased water intake. Out of those seeking advice for the prevention of kidney disease request specific guidelines for water intake and query on the amount of water intake needed To flush" out toxins in the kidney[6]. Furthermore, numerous studies showed an association between drinking soda and an increased risk of kidney damage, but it didn't necessarily prove that soda is the culprit [7] A related study in rats found that moderate consumption of a sugar called fructose increases the kidney's sensitivity to a protein that regulates salt balance. According to the Case Western Reserve University researchers, this leads to increased salt reabsorption by cells in the kidneys, this might explain why soda consumption has been linked to diabetes, obesity, kidney failure and high blood pressure [7]. In addition, a high salt intake has been shown to increase the amount of protein in the urine which is a major risk factor for the decline of kidney function. There is also increasing evidence that a high salt intake may increase deterioration of kidney disease in people already suffering from kidney problems [8,9]. Lack of physical activity, total and light physical activities were found to be positively associated with kidney function [10]. It was found that urinary tract infection and renal stones were important risk factors for CKD in KSA [11]. Although the direct link between obesity and CKD is not clear, but it is well known that obesity contributes to a growing number of associated factors of CKD, such as diabetes and hypertension [12]. High protein (HP) diet consumption has been found, under various conditions leading to glomerular hyper filtration and hyperemia; acceleration of chronic kidney disease (CKD) (13). In Saudi Arabia, CKD represents a major health problem especially in the western region. The number of people requiring kidney replacement therapy in Saudi Arabia is growing, which poses challenges for health professionals and increases the burden on the health care system, and a key factor for reducing the burden of the disease is the development of CKD prevention and control strategies. Thus the objective of this study is to identify the modifiable risk factors of renal disease in Al- Madinah Al-Monawarah region in Saudi Arabia in order to provide valuable opportunities for effective interventions and reducing the risk of death, end-stage renal disease, or complications of renal dysfunction.

SUBJECTS AND METHODS:

A questionnaire based cross sectional study was carried out in Al-Madinah Al- Monawarah region, Kingdom of Saudi Arabia during the period from 20 December 2016 to 20 March 2017.

Study population:

The study population includes all males and females of 15 years and above. A convenience sample of 2500 Persons was collected from different places (e.g. Hospitals - Clinics – Shopping Malls – Restaurants – Universities) in Al-Madinah Al-Monawarah region, during the period of the study.

DATA COLLECTION:

The semi-structured questionnaire used was prepared by the researchers with the help of specialists and experts in this field, the questionnaire included a part of questions on socio-demographic and behavioral factors information as age, gender, educational level/years in university, marital state, smoking, and physical activity, salt intake, protein intake, water consumption, coffee and soda drinking and others.

Also, it included questions for gathering information on medical and health history as family history of CKD, hypertension, diabetes, previous renal stone and recurrent urinary tract infection. The items in the questionnaire were obtained from numbers of validated questionnaires and validity was completed by reviewing it by 3 experts. The questionnaire was re-administered after a week to the same sample of

the pilot study to check test-retest reliability.

Ethical issues:

A written consent was obtained from all the participants after clarification of the aim of the study and the privacy of personal data. The necessary official permissions were obtained before data collection. Approval to conduct the research was obtained from the Taibah University research ethical committee. Collected data was kept strictly confidential and was used only for research purposes.

Statistical analysis:

The collected data was computerized and statistically analyzed using the SPSS program version 22 (SPSS, Chicago, IL, USA). Statistical calculations, data coding, and comparison between categorical variables was done by a chi-squared test. The test results were considered significant when p-value ≤ 0.05.

RESULTS:

Table 1: Socio- demographic characteristics of the study participants (n = 2500)

Characteristics		**(N=2500)**	**%**
Gender			
	Male	958	38.3
	Female	1542	61.7
	Age (years)		
	15 to 20 years	443	17.7
	21 - 25	1292	51.7
	26 - 30	519	20.8
	31- 35	206	8.2
	36 - 40	20	.8
	>40 years	20	.8
Family history of chronic kidney disease		587	23.5
Educational Level	Unmarried	172969.2	
	Married	77130.8	

Marital status

Elementary	13	.5
Intermediate	55	2.2
Secondary	633	25.3
University	1698	67.9
Master and above	101	4.0

Table (1) shows the frequency distribution of the participants according to their socio demographic characteristics. Sixty-one % of the participants were females compared to 38.3% male, highest frequency was for age group 21 to 25 years (51.7%), singles (68.4%), and 67.9% of them had bachelor degrees. 23.5% had a family history of kidney disease or renal failure.

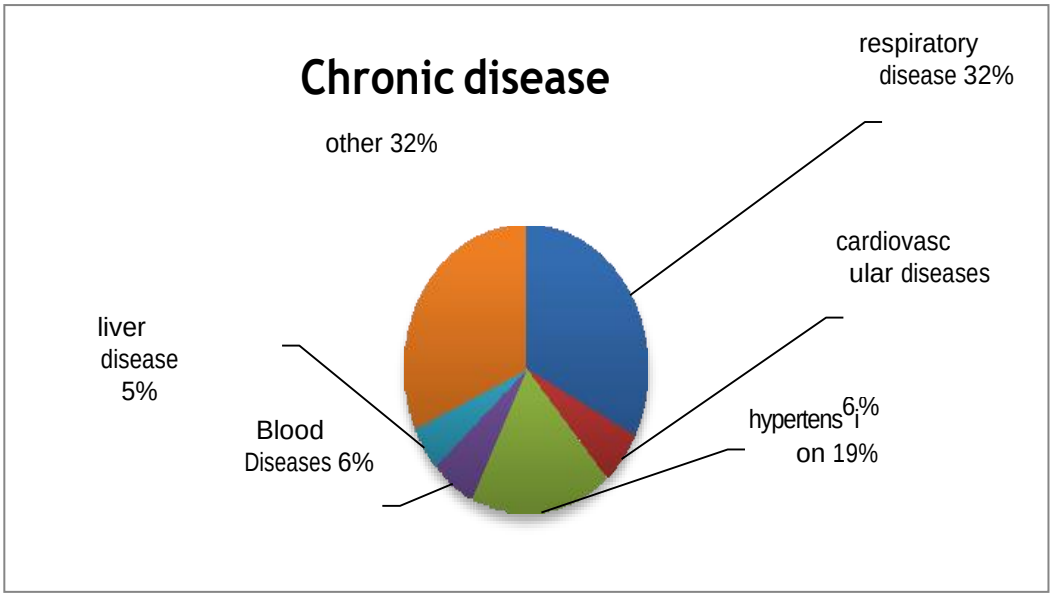

Figure (1): Types of chronic diseases among participants

The vast majority of the participants' do not suffer of any chronic disease, while only 10.8% suffer from chronic diseases (e.g. respiratory diseases, cardiovascular, blood, liver diseases and others) as demonstrated in figure (1).

Table 2: Frequency distribution of the modifiable renal risk factors among the study subjects

Renal modifiable risk factors		N	%
Difficult urination	Yes.	369	14.7
Delay of empty the bladder	Yes.	1914	76.6
Previous infection or stone in urinary tract	yes	383	15.3
Previous infection or stone in kidney	Yes,	122	4.9
Immediate treatment of UTI	Yes.	333	57.3
Smoking	Yes	377	15.1
Rare exercise	yes	1234	49.3
High salt c consumption	Medium to high	1955	78.2
Increase fat consumption	Yes	1920	76.8
Increase fast food and meet consumption	Daily to weekly	3283	98.7
	Less than that	677	27.1
Decrease water consumption	2 cups and less	720	28.2
Coffee consumption	Daily - weekly	3931	32.6
Soft drink consumption	Yes	1991	79.7
Energy drink consumption	Yes	810	32.5
Aspirin or pain killer use	Yes	1627	65
Oral contraceptive use { female }	Yes	135	5.4

The previous table shows the participants' distribution according to multiple risk factors, where we noted that 15.1% of them were smokers and 15.3% of them had difficulty in urination. While, 76.6% of them delay going to the bathroom either because they are busy, being out of the house or just ignore. 15.3% had complained of infections or stones in the urinary tract. Only 4.9% of the participant had ever complained of kidney stones or kidney infection. We noted that 42.8% of them do not immediately treat urinary tract infections. 49.3% of them rarely they exercise sports such as walking or Running, swimming horseback riding. 78.2% of them consume moderate to high amount of salt in their food.78.8% of them consume high amount of fat. 72.9% of them consume fast food daily to weakly. 28.2% of them consume 2 cups and less of water per days. 47.6% of

them consume coffee and stimulants daily. 79.7% consume the soft drink weekly to daily. 32.5% consume the energy drinks weekly to daily. 65% of the participant use medication and painkillers regularly. 5.4% of the female use contraceptive pills.

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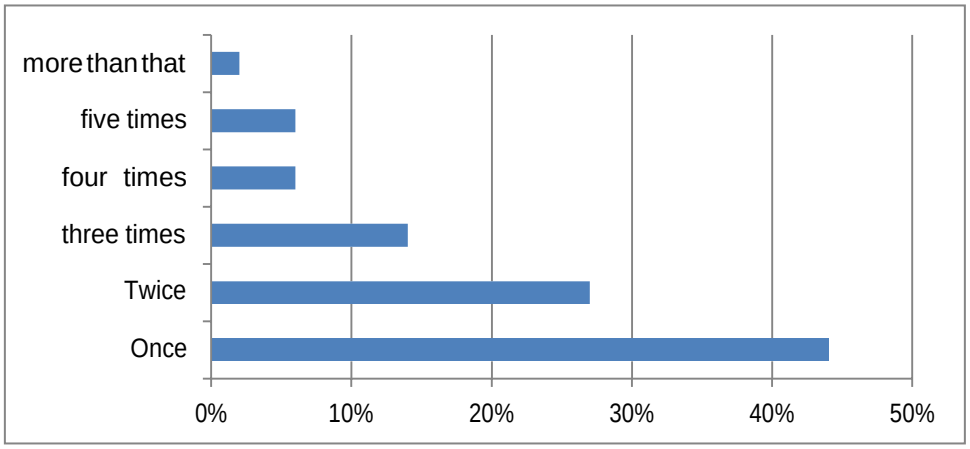

Figure (2): Frequency of injury times among participants who have ever infections or stones in the urinary tract.

This bar chart shows frequency of injury times among participants who have ever infections or stones in the urinary tract where highest percentage (44%) of participants reported one injury time.

Table (3): The relationship between renal modifiable renal risk factors and gender.

Renal modifiable renal risk factors	Gender		χ^2	P-value
	Male	Female		
Difficult urination	141	228	.002	.999
Delay of empty the bladder	678	1236	47.840	.000*
Previous infection or stone in urinary tract	114	269	14.005	.000*
Previous infection or stone in kidney	31	91	9.044	.003*
Immediate treatment of UTI	546	920	3.759	.153
Rare exercise	610	656	123.754	.000*
Smoking	326	51	435.505	.000*
High salt c consumption	702	1253	53.808	.000*
Increase fat consumption	782	1138	29.255	.000*

Increase fast food and meet consumption (Weekly to daily)	810	1013	136.005	.000*
Decrease water consumption (Two cups or less)	158	562	133.742	.000*
Coffee consumption (Weekly to daily)	651	1059	27.070	.000*
Soft drink consumption (Weekly to daily)	576	651	106.764	.000*
Energy drink consumption (Weekly to daily)	163	94	145.584	.000*
Aspirin or pain killer use	537	1090	57.811	.000*

$\chi^{2:}$ Chi-squared test: *Significant at 0.05

We concluded from table 3 that there is a high statistical significant relationship between gender and most of renal modifiable risk factors (e.g. delay of empty the bladder, previous infection or stone in urinary tract, previous infection or stone in kidney, rare exercise, smoking, decrease fruit consumption, high salt c consumption, increase fat consumption, increase fast food and meet consumption, decrease water consumption, coffee consumption, soft drink consumption, energy drink consumption and aspirin or pain killer use) ($p<0.001$). While there is no a significant relationship between gender and difficult urination, immediate treatment of UTI ($p>0.05$).

Table (4): the relationship between modifiable renal risk factors and Age.

Renal modifiable renal risk factors	Age (years)						χ^2	P-value
	<20ys	**20 – 25ys**	**26 - 30ys**	**31 – 35ys**	**36-)y s**	**> 40ys**		
Difficult urination	91	169	81	25	1	2	23.93	.008 *
Delay of empty the bladder	356	983	397	151	15	12	16.36	.090
Previous infection or stone in urinary tract	39	178	106	52	5	3	44.37	.000 *

Previous infection or stone in kidney	19	55	36	10	1	1	6.14	.292
Immediate treatment of UTI	200	751	357	130	15	13	71.53	.000 *
Rare exercise	210	595	282	123	14	10	39.54	.006 *
Smoking	30	158	126	55	4	4	88.83	.000 *
High salt c consumption	355	1022	409	158	15	16	23.676	.071
Increase fat consumption	352	987	391	161	15	14	13.818	.181
Increase fast food and meet consumption Daily to Weekly	310	183	396	151	13	14	9.288	.505
Decrease water consumption Two cups and less	148	397	140	29	4	2	41.0	.000 *
Coffee consumption Weekly to Daily	267	858	393	160	16	16	64	.000
Soft drink consumption Weekly to Daily	219	637	258	98	11	4	28	.000
Energy drink consumption Weekly to Daily	48 11	117 17	32 11	15 3	1 0	1 0	56	.027
Aspirin or pain killer use	273	844	330	336	16	17	52	.083
Oral contraceptive use { female }	4	46	59	18	3	2	56	.000

χ^2: Chi-squared test: *Significant at 0.05

We concluded from the above table that there is a statistical significant relationship between age and most of renal modifiable risk factors (e.g: Difficult urination, Previous infection or stone in urinary tract, Immediate treatment of UTI, rare Exercise, Smoking, Decrease fruit consumption, Decrease water consumption, Coffee consumption, Soft drink consumption, Energy drink consumption, Oral contraceptive use for females) ($p<0.05$).While there is no significant relationship between age and (Delay of empty the bladder, Previous infection or stone in kidney, High salt c consumption, Increase fat

consumption, Increase fast food and meet consumption and Aspirin or pain killer use). (p>0.05).

Table (5): Relationship between modifiable renal risk factors and educational level.

nodifiable renal risk factors	Educational Level					χ^2	P-value
	Eleme ntary	Interm ediate	Seco ndar y	versi ty	aster and above		
Difficult urination	1	13	106	233	16	26.433	.001*
Delay of empty the bladder	8	36	478	1319	73	15.571	.049
Previous infection or stone in urinary tract	3	9	75	276	20	9.237	055
Previous infection or stone in kidney	4	0	33	77	8	24.192	.000
Immediate treatment of UTI	10	31	311	1047	67	40.685	.000*
Rare Exercise	2	29	295	890	50	25.119	.068
Smoking	4	8	105	240	20	6.579	.160
High salt c consumption Medium to High	12	47	495	1332	69	29.520	.003*
Increase fat consumption	12	42	504	1293	69	14.744	.064
Increase fast food and meet consumption Daily to Weekly	12	38	455	1241	77	8.412	.394
Decrease water consumption	1	20	187	477	35	16.452	.171
Coffee consumption Weekly to Daily	4	38	398	1191	74	58.164	.000*
Soft drink consumption Weekly to Daily	4	31	319	830	43	13.388	.342
Energy drink consumption Weekly to Daily	3	8	82	155	8	32.466	.001*
Aspirin or pain killer use	11	30	418	1099	69	9.919	.623
Oral contraceptive use (female)	2	4	82	92	6	17.990	.324

$\chi^{2:}$ Chi-squared test: *Significant at 0.05

Table 5 shows the relationship between modifiable renal risk factors and educational level. There is a statistical significant relationship between majority of renal modifiable risk factors and educational level especially secondary and university education (e.g. Difficult urination, Delay of empty the bladder, previous infection or stone in kidney, Immediate treatment of UTI, Decrease fruit consumption, High salt c consumption, Coffee consumption, Energy drink consumption). While there is no significant relationship between Educational Level and: Previous infection or stone in urinary tract, rare Exercise, Smoking, Increase fat consumption, Increase fast food and meet consumption, Decrease water consumption, Soft drink consumption, Aspirin or pain killer use, oral contraceptive use { female }.

DISCUSSION:

To the best of our knowledge this is the first study to be carried out in Almadeinah city, Kingdom of Saudi Arabia concerning this valuable issue. The data were collected from 2500 participants who accepted to participate in this study. Self-reported renal risk factors were identified from each participant. The age of the participants ranged from 15 to above 40 years with more female participants than male. Of the 2500 respondents, 10.8% suffer from chronic diseases (e.g. respiratory diseases, cardiovascular, blood, liver diseases and others). Poverty, low income and other socioeconomic factors, with consequent limited access to health care, have been reported to contribute to the incidence and prevalence of chronic kidney disease in previous studies (14)

The modifiable risk factors are the focus of treatment to halt disease progression. In the current study, high levels of modifiable renal risk factors were identified in varying proportion among the study population (e.g. high consuming of soft drink, high fat, salt in food, delay bladder emptying and high fast food consumption (79.7%, 78.8%, 78.2%, 76.6%, 72.9% respectively). Other risk factors were reported previously as higher levels of proteinuria, a lower serum albumin level, higher blood pressure, poor glycemic control, and smoking (National Kidney Foundation, 2002) (15)

It was identified that smoking represents a major cardiovascular risk factor that promotes the progression of kidney disease(16).

In the current study, smoking was found among 15.1% of the study population in the present study. Also, another study conducted in hail region showed that smoking accounted for 20% of the male participant [17].

Moreover, the findings of this study show that 42.8% of subjects do not immediately treat urinary tract infections with higher significant difference among females than males. Difficulty in urination or delay in emptying is one of the indications for urinary tract infections which contribute for about 0.8% and 8.6% respectively of those who get UTI. Urinary tract infection (UTI) may be associated with sepsis or septic shock, and cause sudden deterioration of renal function as reported by previous study [32].

It was known that higher intakes of fluid appear to protect against CKD. However; in the current study, 28.2% of the participant showed decrease water consumption. In addition, participants who had the highest quintile of fluid intake (3.2 L/day) had a significantly lower risk of CKD (odds ratio 0.5, 95%CI 0.32 to 0.77, P= 0.003) as reported in previous study conducted by Strippoli G(19).

Furthermore, 49.3% of participants reported that they rarely do exercise, while the study conducted by Painter P showed that low exercise capacity (20), muscle wasting (21), and poor physical performance (22) are highly prevalent among patients with End Stage Renal Disease (ESRD) and potentially modifiable with exercise interventions.

Concerning salt intake, 78.2% of the participant had high salt consumption, the impact of salt restriction on the evolution of kidney disease has been clearly documented (23) Moreover, in the prospective study on 1173 men and 1263 women, 24-h urinary sodium excretion was measured at baseline and a 17-year follow-up documented that a high sodium intake predicted mortality, particularly in males and overweight individuals [24].

From different quarters, concerns have been raised about potential adverse effects of low salt (25).

It was obvious that fat, meet consumption, energy and soft drink consumption was increased in this study population (76.8,98.7 , 79.7, 32.5) respectively. A recent systemic study revealed that a healthy diet comprising many fruits and vegetables, nuts fish, legumes, whole grains, and fibers and also the cutting down on red meat, sodium, refined sugar and low in saturated fat was associated with lower rates of age-adjusted all-cause mortality in individuals with CKD. Beneficial effects of diet may be mediated by favorable effects on blood pressure (BP), glucose, and lipids (26) (27).

In our study, higher percent (65%) of the participant use aspirin and analgesia regularly. However; a

previous study showed that analgesic use was not associated with an increased risk for ESRD up to 3.5 kg cumulative lifetime dose (98 % of the cases with ESRD). While the large subgroup of users with a lifetime dose up to 0.5 kg (278 cases and 1365 controls) showed a significantly decreased risk (28). Various authors have cited the habitual consumption of analgesics or analgesic abuse as contributing to the increasing prevalence of chronic renal disease in Nigerian communities. (29) (16).

In this study, 5.4% of the female participants use oral contraceptive and there is a previous study has shown that, oral contraceptives are able to increase the glomerular filtration rate, and certain types have a protein catabolic effect (30).

This study found a significant association between gender, age and most of renal modifiable risk factors. Similarly, it was earlier elucidated by Rowe et al. that kidney function declines naturally with increasing age.(31) Furthermore, Mulder et al. reported a substantial reduction in kidney function with ageing.(32) As CKD was commoner in subjects older than 55 years, so it is essential to screen people in this age group which is an important strategy for the detection of chronic kidney disease

On the other hand, previous study showed that those with less than high school education had 1.7 times CKD risk in comparison with those with college education. (33). Also, male gender was reported to be a non-modifiable risk factor CKD (34).

Prevention of adverse outcomes of CKD could be facilitated by evaluating individuals with risk factors, to enable earlier detection, and by risk factor reduction in individuals without CKD, to prevent or slow the development of the disease.

LIMITATIONS:

There are some potential limitations in this study, being a descriptive cross-sectional study, therefore, no direct relationship between variables and outcomes can be proved and bias associated with the self-administered questionnaire.

CONCLUSIONS AND RECOMMENDATIONS:

It was concluded that, there is relatively high frequency of modifiable risk factors of renal disease in Al-Madinah Al-Monawarah region, Saudi Arabia. Therefore; attention needs to be paid to the risk factors for chronic kidney disease especially modifiable one. Also, interventions that delay and prevent the onset of diabetes mellitus, reduce obesity, support smoking cessation, and control hypertension and dyslipidemia should be considered to improve mortality, morbidity, and disability, and specifically, to prevent or delay CKD. At-risk populations or individuals must be screened and treated early to prevent onset and delay progression if the disease has took place.

Conflict of interests

The authors declared that there is no conflict of interests.

Funding

None

Acknowledgments

The authors are thankful all participants of the study for their cooperation

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