

ORIGINAL ARTICLE

Prevalence and Awareness of Chronic Kidney Disease among People in Rural, Agency and Urban Areas of Visakhapatnam District, Andhra Pradesh, India

Sharon Sandhi^{1*} and Manjulatha C.²

^{1*}Research Scholar, Department of Zoology, Andhra University, Visakhapatnam-530 003.

²Professor, Department of Zoology, Andhra University, Visakhapatnam-530 003.

Email: sharon.sandhi@gmail.com

ABSTRACT

Chronic kidney disease is rising to be an important disease worldwide. Both the incidence and prevalence of chronic kidney disease (CKD) is rising globally. People living in developing countries are speculated to suffer the consequences due to economic scarcity and high cost of treatment. The prevalence of CKD is highly variable in different parts of the world due to a variety of environmental, ethnic, racial, socio-economical and rural-urban differences. Though population based screening studies have been performed in developed countries, there are very few studies in developing countries and especially in India where people are ignorant of the true prevalence and incidence of CKD. Public awareness is a key determinant to overcome the burden of Chronic Kidney Disease. In the present study, a cross-sectional population study was conducted among 1340 respondents residing in agency, rural and urban areas of Visakhapatnam District, Andhra Pradesh, India during the period from 2016-2018 using a pre-structured and validated questionnaire. The present study was undertaken to investigate the prevalence of chronic kidney disease among people in these three domiciles. The questionnaire included information regarding socio-demographic characteristics and questions related to awareness of sample persons regarding kidney function and food habits leading to kidney failure. The present study exposes scope for creating efforts to increase the awareness of chronic kidney disease using population and individual-based measures.

Keywords: Chronic kidney disease, prevalence, questionnaire, kidney failure.

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INTRODUCTION

Chronic diseases also known as Non-communicable diseases (NCDs), have a propensity to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioral factors and account for nearly 60% of all deaths worldwide. A quick global survey conducted by the World Health Organization (WHO) to assess Non-Communicable Diseases (NCDs) management during COVID-19 found out that NCDs have huge impact especially in low and middle-income countries [17]. As per the World Health Organization (WHO), enhanced control of infectious diseases, rapid urbanization and an aging population will amplify probable chronic deaths to about 52 million by 2030 [10].

Chronic Kidney Disease (CKD) is regarded as one of the clinical models of accelerated vascular disease and premature ageing and the risk-factor profile changes during the progression from mild moderate CKD to End Stage Renal Disease (ESRD) and chronic renal failure is characterized by a steady loss of kidney function. Chronic kidney disease can advance to end-stage kidney failure which is lethal without dialysis or a kidney transplant. Signs and symptoms of chronic kidney disease build up over time which includes nausea, vomiting, loss of appetite, fatigue and weakness, muscle twitches and cramps, swelling of feet and ankles etc. Chronic Kidney Disease is defined as the presence of either kidney damage or glomerular filtration rate (GFR) <60 ml/min/1.73 m² [12]. Chronic kidney disease (CKD) is swiftly assuming epidemic proportions worldwide and in India too, there is a significant burden of CKD although the exact figures vary [8, 15]. This has been attributed to the increasing prevalence of diabetes,

hypertension and ischemic heart disease. It was evident that the awareness level among the people is poor. As a minimum, 70% of the people live in rural areas with limited access to health care services with the result that CKD is often diagnosed in advanced stages and the cost of treatment of advanced CKD is extensive [1].

Epidemiological survey help to study the distribution and determinants of health-related states or events in specified populations and the application of the study is the prevention and control of health problems. Studies on the prevalence of chronic diseases help in focusing interest to the magnitude of the trouble and planning preventive measures. In a country with limited resources, it is only correct that efforts are directed towards prevention of CKD rather than the treatment. Population-based studies in tropical and subtropical countries are required to assess the global patterns of burden of disease from CKD. Early detection and education can prevent the progression of kidney disease to kidney failure. There have been reports of increasing presence of CKD in rural and coastal areas especially reported in Andhra Pradesh, India [9].

Only a few studies have been reported about the prevalence of CKD in urban populations of Andhra Pradesh, but there is lack of such studies in the rural populations. Hence, the present study has been taken up with the objective to investigate the prevalence of CKD among the three domiciles of Visakhapatnam district and to investigate the extent of awareness among sample respondents about kidneys and their functions and also food habits and their risk for kidney failure. The present epidemiological survey study has been conducted to emphasize the degree of awareness among the three domiciles of Visakhapatnam with respect to chronic kidney disease, kidney functions and kidney risk complications.

MATERIAL AND METHODS

The present investigation has been taken up with the objective to study the prevalence of CKD among the three domiciles of Visakhapatnam district - agency, rural and urban respondents in 43 mandals of Visakhapatnam District, Andhra Pradesh during the period 2016-2018 from the collected demographic data. The study also reports the extent of awareness among the respondents in the three domiciles with respect to chronic kidney disease, kidney functions and kidney risk complications. The following are the list of agency, rural and urban mandals of Visakhapatnam district selected for the present study.

Agency mandals [11]: Ananthagiri, Araku Valley, Chinthapalle, Dumbriguda, G. K. Veedhi, G. Madugula, Hukumpet, Koyyuru, Madugula, Munching Puttu, PedaBayalu.

Rural mandals [22]: Anakapalli, Butchyyapeta, Cheedikada, Chodavaram, Achuthapuram, Devarapalli, Lingampeta, K.Kotapadu, Kasimkota, Rambilli, Bodapalem, Makavarapalem, Munagapaka, Dondawaka, Narsipatnam, Nathavaram, Paderu, Payakaraopeta, Ravikamutham, Komaravolu, Koruprolu, Yalamanchili.

Urban mandals [10]: Anandapuram, Bheemunipatnam (Bheemili), Gajuwaka, Padmanabham, Paravada, Pedagantyada, Pendurthi, Sabbavaram, Vizag-Urban, Vizag -Rural.

A well informed oral consent was taken from all the subjects involved in the study. All the respondents were administered a structured pre-tested questionnaire taking into account the area-wise, age-wise, marital status, educational status, employment status etc. All the subjects were inquired about the presence or absence of symptoms suggestive of CKD and its co-morbid symptoms. The respondents were questioned about the number of healthy kidneys needed to lead a normal life and their function, food habits of family respondents and their risk for kidney failure. The data collected from the respondents was analyzed using appropriate statistical methods (SPSS 16.0). Descriptive analysis of the epidemiological data collected from the respondents was evaluated by frequency calculation, mean values and calculated probability (p-value hypothesis testing). Chi square was used to study the association between definite variables. $P \leq 0.05$ was considered to be statistically significant.

RESULTS

A total of 1340 respondents were taken into consideration from three domiciles of Visakhapatnam District. Out of the 1340 respondents, 52.50% are males and 47.50% are females (Figure 1). The socio-demographic distribution for the area of living shows a total of 49.30% (N=660) of subjects belong to the rural area which is twice that of urban and agency areas 26.1% (N=350) and 24.6% (N=330) respectively. Distribution according to the area of living showed rural participants with a significant p-value < 0.05.

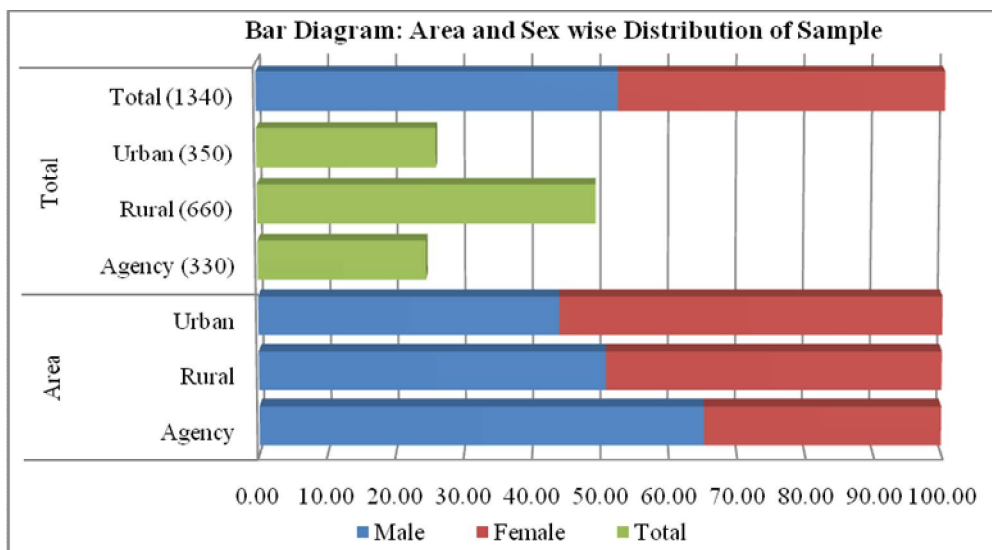


Figure 1. Bar Diagram showing Area and Sex wise Distribution of Sample

Prevalence of chronic kidney disease (CKD) among agency, rural and urban persons

It is evident from the results that among the total respondents, 66% were found to be healthy and 34% diseased. The major disease conditions were diabetes (2.3%) next to that of hypertension (7.1%) whereas cardiac, cerebrovascular and hyperlipidemia were of small proportion in the present study (Figure-2). The study showed 2.4% (N=32) of the participants were affected by CKD in all the three domiciles. However, the study distribution with an area of living showed rural people (3.3%) are significantly more affected than agency (2.1%) and urban (0.90%) respondents.

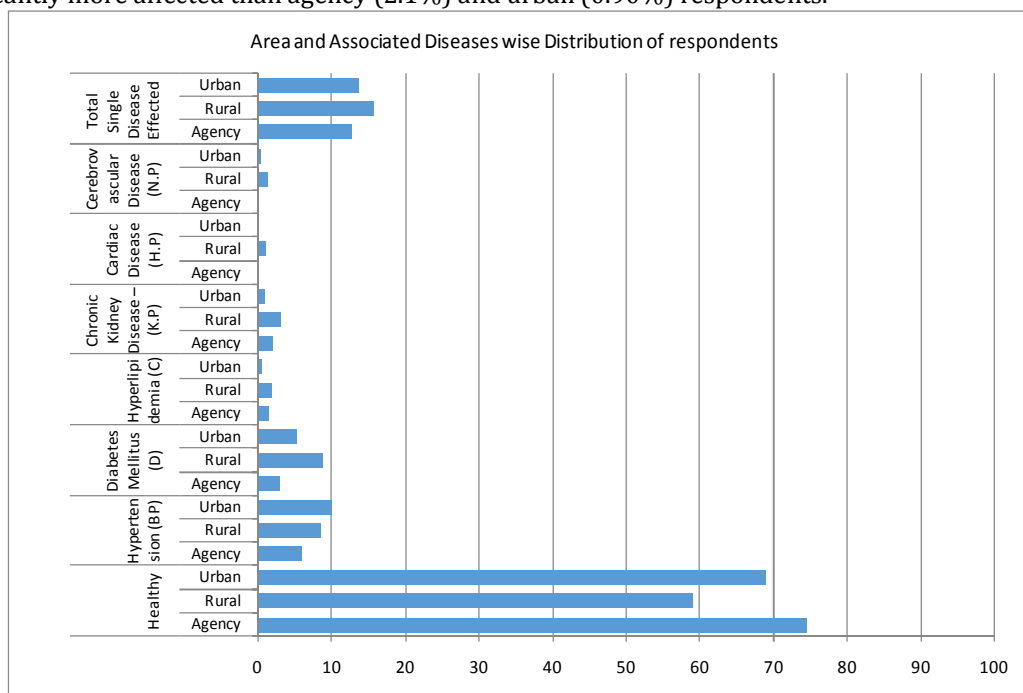


Figure 2. Area and Associated Diseases wise Distribution of respondents

Awareness regarding the number of healthy kidneys needed to lead a normal life

Area and Sex wise awareness

From Figure-3, it is apparent that 87.9% of males and 75.3% of females were aware of the number of kidneys required for a normal life, however, 0.5% of females answered to have only one kidney, while 12.1% of males and 24.2% of females were not aware of the number of healthy kidneys needed. Urban respondents were more aware than the agency and rural people.

Area and educational status wise awareness

Awareness with regard to educational status showed 100% of primary and post-graduate educated respondents, 97% of below secondary, 98% of above secondary and 99.6% of graduates subjects had

knowledge about number of kidneys being two (Figure 4). Even the uneducated subjects (51%) were aware of two kidneys in the human system. However, a small proportion of uneducated answered to have one kidney rather have two (0.6%).

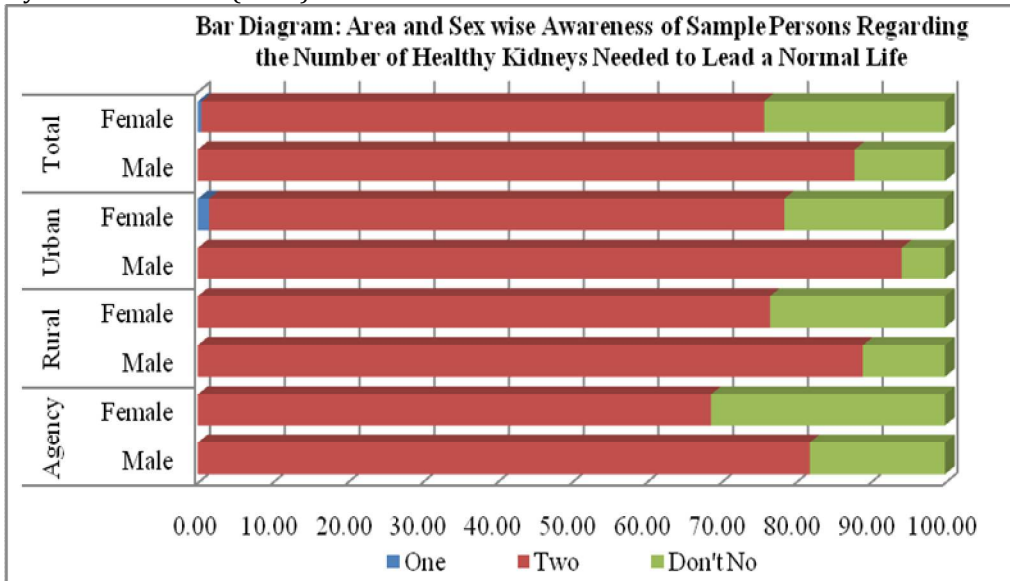


Figure 3. Area and sex wise awareness of sample respondents regarding the number of healthy kidneys needed to lead a normal life

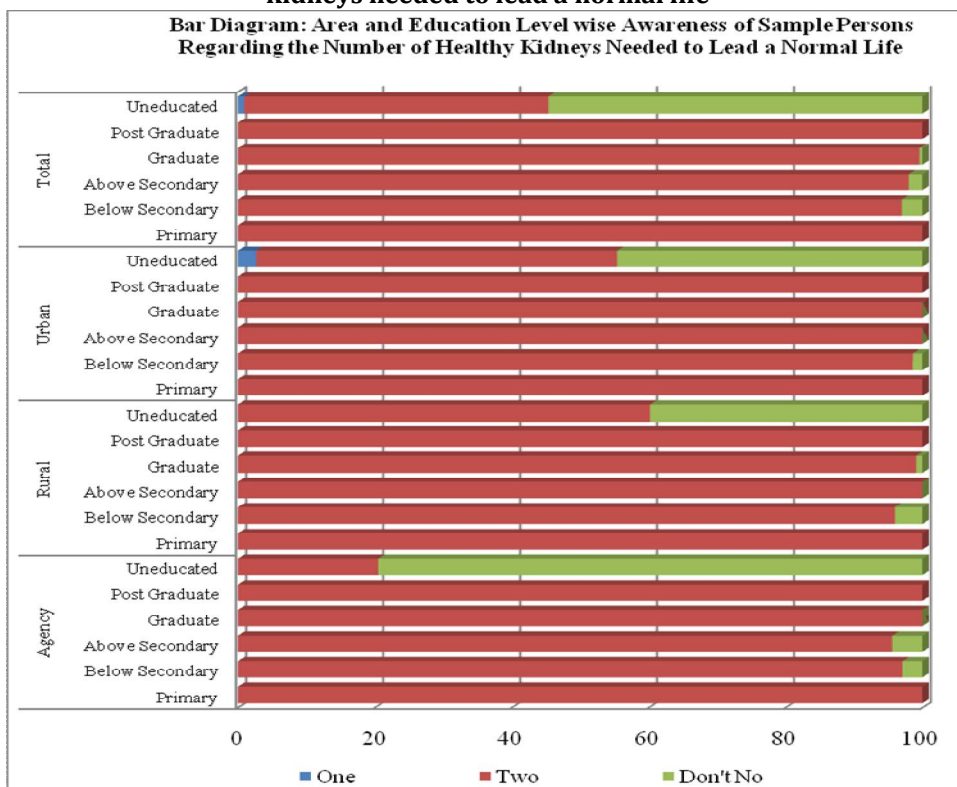


Figure 4. Area and education level wise awareness of sample respondents regarding the number of healthy kidneys needed to lead a normal life

Awareness of sample respondents about the functions of kidneys

Area and gender wise sample subjects awareness of kidney's function

It is evident that 87.2%, 71.3%, 70.2% and 60.2% were not aware of the function of kidneys such as reabsorption of nutrients, formation of urine and blood filtrations and others correspondingly among males respondents, while, 81%, 62%, 58% and 50.6% of females were unaware about the kidney function in the same order (Figure-5). The results showed that only 0.4%, 0.6%, 0.6% and 1.6% of male respondents were aware of the function of kidneys such as reabsorption of nutrients, formation of urine,

blood filtrations and others correspondingly, while, 0.6%, 0.2%, 0.8% and 1.6% of females were aware of the kidney function in the same order. Conversely, 18.4%, 37.3% and 41.2% of females answered that the kidney doesn't function for reabsorption of nutrients, formation of urine and blood purification, while, 12.4%, 28.1% and 29.3% of males answered that the kidney doesn't function any of these such as reabsorption of nutrients, formation of urine and blood filtration.

Area and education-wise sample subjects awareness about the function of kidneys

From Figure-6, it is clear that the subjects with primary education in the rural area were aware of the function of kidneys such as reabsorption of nutrients (1.8%), blood filtrations (3.6%) and others functions (14.3%). Likewise, in secondary educated subjects, 0.8% knew about the reabsorption of nutrients, 2.4% knew about the formation of urine, 0.8% about blood filtration and 3.2% about other functions.

The study showed that about 18% subjects from rural area with graduation were aware of reabsorption of nutrients by kidneys, 0.9% about formation of urine, 0.9% about blood filtration by kidneys and also about the other functions. Postgraduates 7.1% of urban region were aware about urine formation by the kidney, the percent of the uneducated that had knowledge about the formation of urine 1.1%, filtration of blood 1.5%, and 2.2% about other functions correspondingly. The others had no idea and were unaware of kidney function.

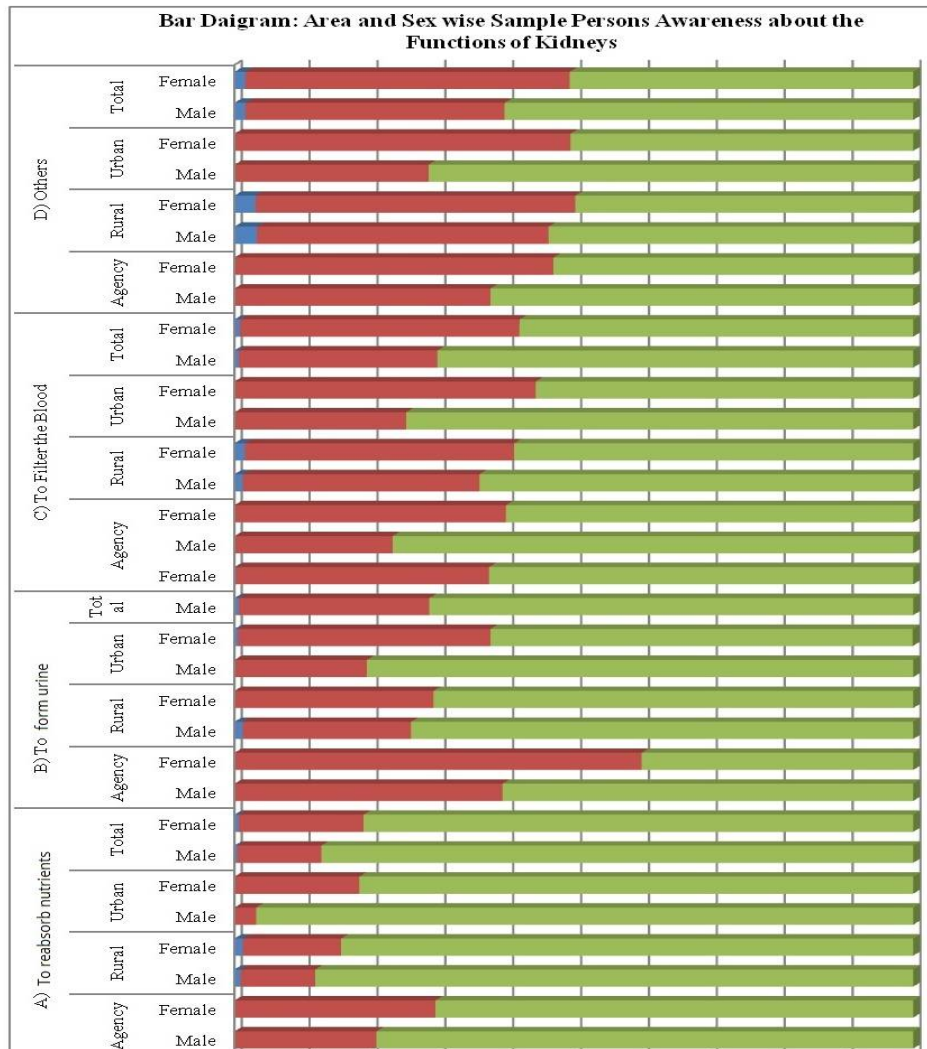


Figure 5. Area and sex wise sample respondents' awareness about the functions of kidneys

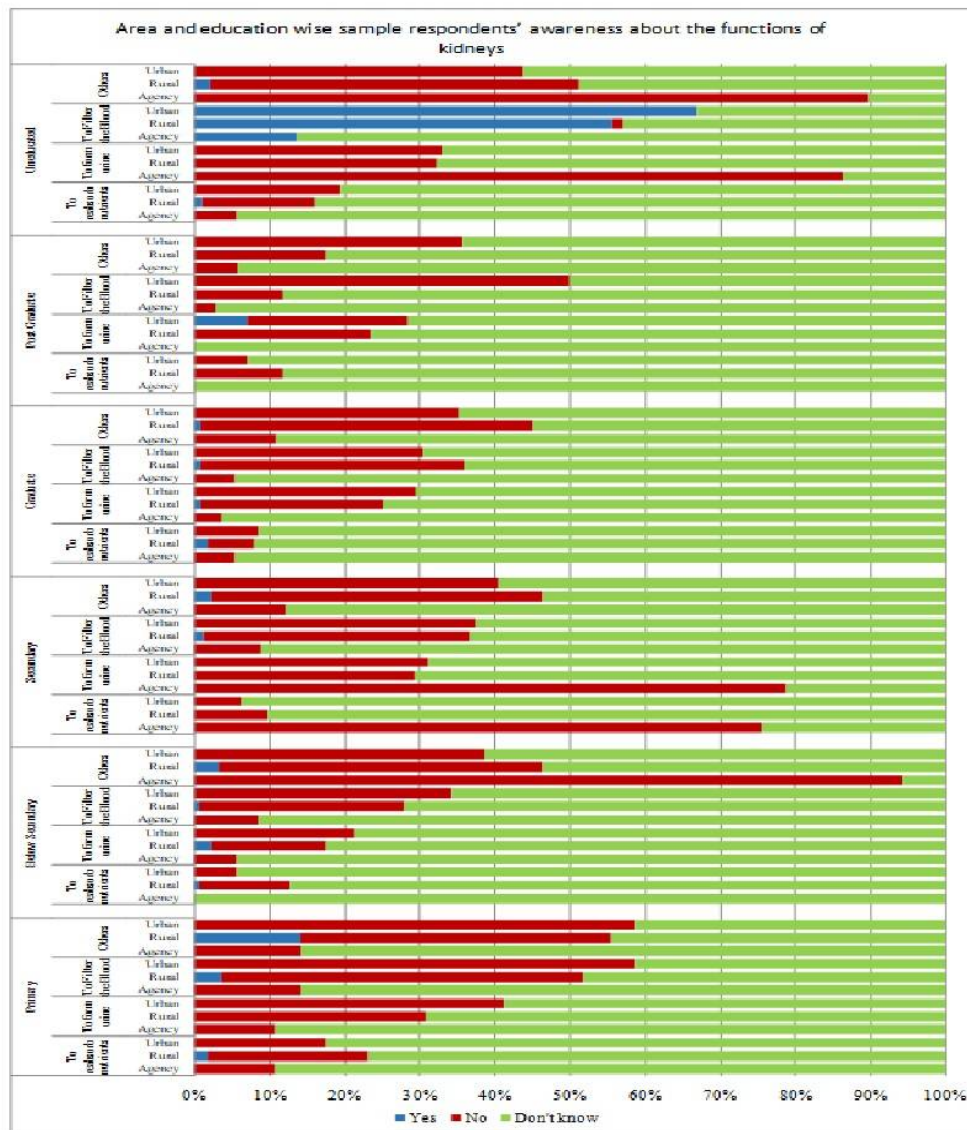


Figure 6. Area and education wise sample respondents' awareness about the functions of kidneys
Effect of drinking water, adulterated foods and beverages on kidney disease: Area and gender-wise awareness

When questioned whether they were aware of the risk of drinking tap or bore water, male individuals of agency (99.1%), rural (99.7%) and urban (90.9%) areas responded "Yes", while 0.5% of agency and 1.9% urban males responded "No". However, only a few people were unaware of this risk on kidney damage. Similarly, 98.3% agency females, 99.7% rural females, 95.9% of urban females responded "Yes" for tap water or bore water consumption affects kidney whereas 0.9% and 1% of agency and urban females respectively each responded "No" while others were unaware of the risk about water intake (Figure-7).

When inquired about the risk of consuming fast foods on kidney damage male individuals, rural (1.5%) and urban (9.1%) individuals responded "Yes", while 49.3% of the agency, 59.3% of rural and 66.9% urban males responded "No". However, few people were unaware of the risk to kidneys by fast food consumption. Similarly, 1.5% rural females and 5.6% of urban females responded "Yes", while, 53.9%, 59.7% and 58.2% of agency, rural and urban females responded "No". Fast foods do affect kidney damage and other respondents were unaware of the risk with fast food consumption.

When questioned whether adulterated foods had a risk on the kidneys, only rural males responded to have risk (0.6%) while, the answer was "No" in male individuals of agency (47%), rural (58.2%) and urban (71.4%). However, others were unaware of the risk of adulterated foods. Also, females answered to have risk but in low proportions, 0.9% each of agency and rural females, response was "No" in major females of agency (54.8%), rural (61.2%) and urban (64.3%). The others all were very innocent of the

risk of adulterated foods. Awareness of risk to kidneys on consuming soft drinks and beverages revealed only 0.6% or rural male and females was aware of it, while major of them are unaware and replied no risk with drinking habits.

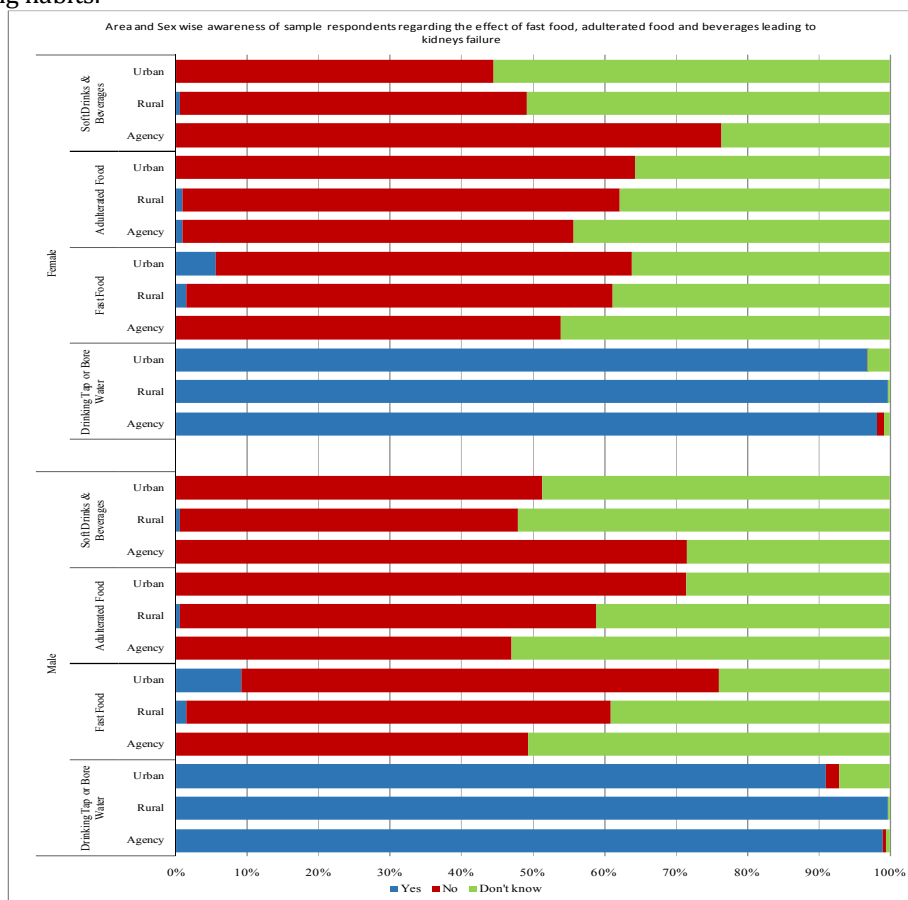


Figure 7. Area and gender wise awareness of sample respondents regarding the effect of fast food, adulterated food and beverages leading to kidneys failure

Effect of drinking water, adulterated food and beverages on kidney disease: area and educational status wise awareness

When questioned whether the respondents were aware of the risk of drinking tap or bore water, individuals with primary education of the agency (96.4%), rural (100%) and urban (100%) areas responded "Yes", while 3.6% of agency responded "No" (Figure-8). Similarly, 100% respondents of the agency with below secondary education, 99.2% rural individuals with below secondary education and 95.7% of urban responded "Yes" for drinking tap or bore water-affecting kidneys. Respondents with secondary education (98.9%), graduates (98.2%), postgraduates (100%) and uneducated (98.9%) in the agency area replied positive for risk associated with kidney damage and water variations.

When inquired about the risk of fast foods on kidney damage, respondents of rural areas showed 5.4% of primary, 0.8% below secondary educated respondents, 1.2% secondary educated subjects and 1.9% uneducated subjects replied to have awareness. Likewise, in urban subjects, 4.3% with below secondary education, 3.1% with secondary education, 7.1% with postgraduates and 16.1% uneducated were aware of the risk.

When questioned whether adulterated foods have a risk on the kidney, only a few subjects from the agency, i.e 3.6% with primary class educated responded to the knowledge of having risk with adultery foods. However, others were unaware of the risk of adulterated foods.

Awareness of risk to kidney on consuming soft drinks and beverages revealed only 3.6% rural primary educated subject and 0.7% uneducated subject were aware of it, while major of them were unaware and replied no risk with drinking habits.

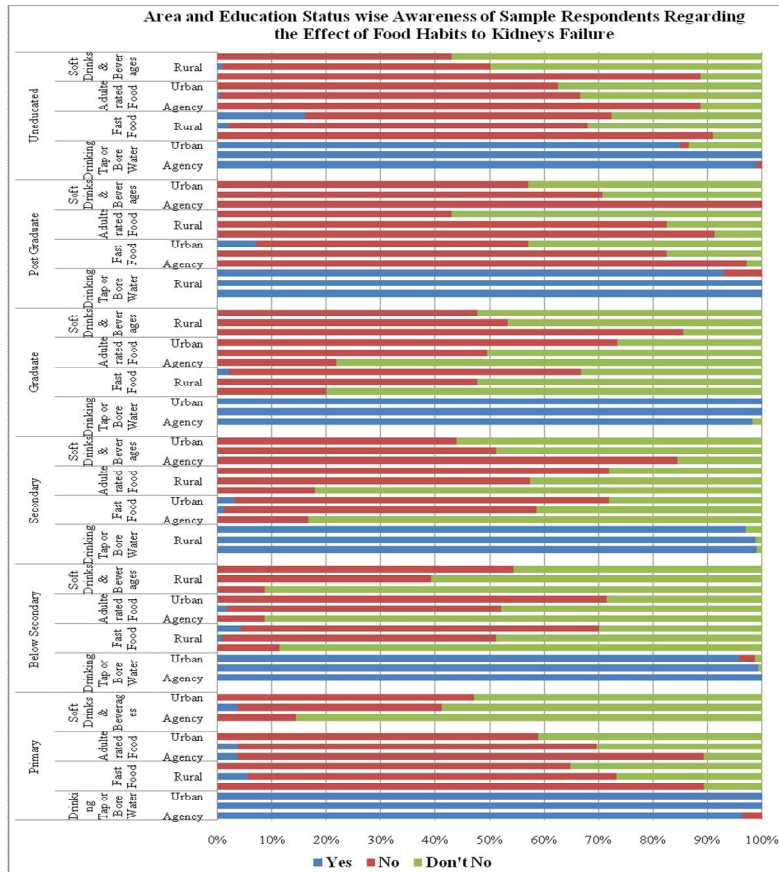


Figure 8. Area and Education status wise awareness of sample respondents regarding the effect of fast food, adulterated food and beverages leading to kidneys failure

Area and Sex wise awareness of sample respondents regarding the effect of pain killers, snake bite, country or indigenous medicine and urinary infection and kidney risk

Awareness of the effect of pain killers on kidney damage showed 47%, 52.8%, 64.3% of agency, rural and urban male respondents respectively was unaware of the consequence (Figure 9). While, only 0.9% of rural females were aware of the outcome. Awareness of snakebite and kidney damage among the male respondents showed only rural individuals 0.3% were aware and others (51.7% in total) answered "No", while females response was "Yes" in agency (0.9%), rural (0.3%) and urban (0.5%). Effects of indigenous or country medicine on kidney damage showed males having awareness 0.3% and 0.9% males and females habitants of rural area. Whereas in other areas such as agency and urban, it was a naive response. On the other hand, 10.2%, 24.3% and 14.3% male residents were aware of urinary tract infection (UTI) and kidney damage effect in all three areas- the agency, rural and urban males correspondingly. In the same order of domicile, 15.7%, 17.6% and 7.1% of female respondents gave a positive response.

Area and educational status awareness of sample respondents regarding the effect of pain killers, snake bite, country or indigenous medicine and urinary tract infection and kidney risk

The survey in the rural area for awareness on the effect of pain killers, snake bite, indigenous medicine and UTI on kidney damage showed 3.6% of the respondents in agency and rural with primary education were aware of the first three consequences and 1.8% of the rural respondents were aware about UTI and kidney damage association. Nevertheless, 3.6% primary educated, a habitants of agency replied positively for the effect of pain killers and UTI in damaging kidneys (Figure 10).

In the same way, only rural respondents, 1.6% and 0.9% with below secondary class education replied optimistically for the effect of pain killers and UTI that can damage kidneys. In the same habitant, 0.4% of respondents who were uneducated but were aware of the consequences of both pain killers and UTI, and also indigenous medicine (0.7%). All other respondents replied having no idea about the effects with painkillers, snake bite, indigenous medicine and UTI.

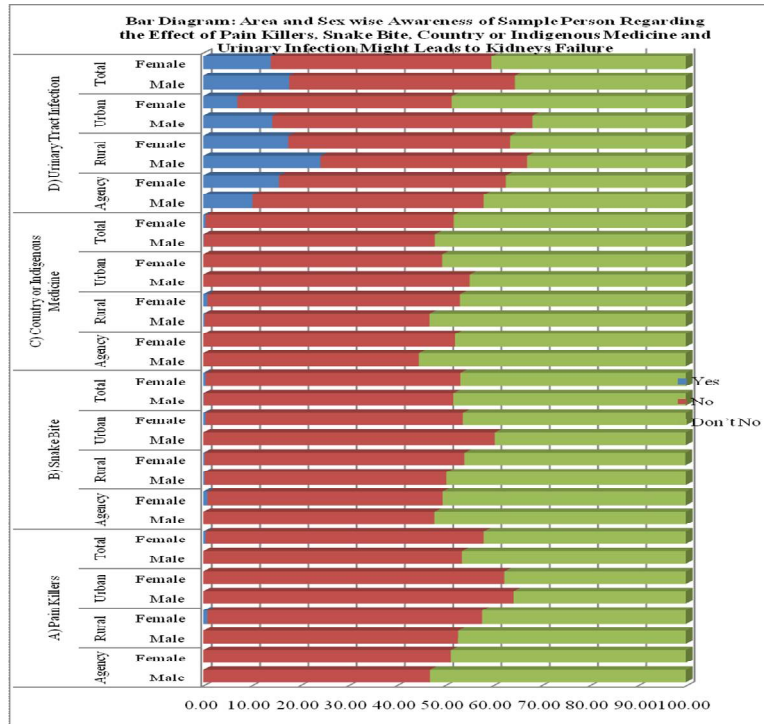


Figure 9. Area and Sex wise awareness of respondents regarding the effect of pain killers, snake bite, country or indigenous medicine and urinary infection might leads to kidneys failure

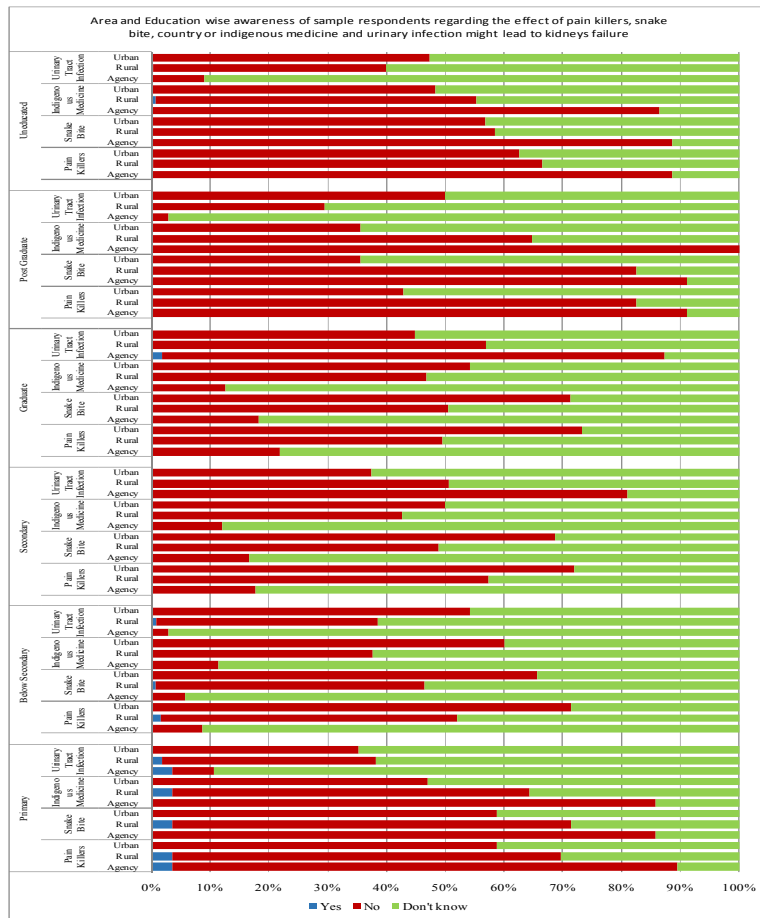


Figure 10. Area and Education wise awareness of sample respondents regarding the effect of pain killers, snake bite, country or indigenous medicine and urinary infection might lead to kidneys failure

DISCUSSION

Even though there are quite a lot of hospital based documented studies on the prevalence of CKD in India, population based studies are very few and mostly carried out in urban India [2, 16]. A large community based study from South India has been investigated in which the prevalence of CKD in the rural population was studied. However, the study was basically intended at screening for risk factors, treatment, follow up and studying the prevention of CKD [13].

The socio-demographic profile of the sample respondents (n=1340) was studied in the three domiciles and rural males and females were found to be in higher proportion than the other two domiciles which is twice that of urban and agency areas. The distribution of health status of the respondents revealed that half of the respondents were healthy (49.7%) and the rest were diseased having one or more ill-health conditions in the three domiciles and the distribution was more in the rural area. The major disease conditions observed were diabetes next to that of hypertension where cardiac, cerebrovascular and hyperlipidemia were of small proportion and the distribution was found much higher in rural and urban areas. The study showed 2.4% of the participants were affected by CKD and the study distribution with an area of living showed rural people were significantly more affected than the others.

Though it is supposed that the prevalence of CKD is increasing in India, the exact figures for the incidence vary among the different studies as studies are carried out using different defining criteria. In an investigation carried out in urban Delhi using criteria of serum creatinine more than 1.8 mg/dl as the cutoff and other self assessment data from the respondents, it has recorded the prevalence of 0.79% (2). Another population-based survey of two major cities Delhi and Chennai discovered that CKD is evident in 8.7% of the adult population and one in five participants with CKD were found to be in the upper risk categories for adverse events and nearly a third to half of the participants with CKD have high risk for experiencing a cardiovascular event [3]. Rai *et al.* [14] studied the prevalence of CKD and patterns of known risk factors among the general population at Opal Hospital in Varanasi and observed 29.3% of overall prevalence of CKD in the participants. Anupama and Uma [4] studied the prevalence of CKD and associated risk factors among adults in a rural population near Shimoga, Karnataka using demographic, anthropometric and clinical data and the prevalence of CKD was found to be 6.3%.

The current study survey has also been focused to know whether the respondents have a general idea about the kidney and its function and how many kidneys are required to live a normal life. Urban male and female respondents are more aware about the number of kidneys required to lead a normal life than the agency and rural people. Secondary education and uneducated respondents in agency area were not aware about the number of kidneys necessary for healthy life, whereas graduates and post graduates in the three domiciles were totally aware regarding number of kidneys required. Therefore, education had a significant positive influence on the respondent's awareness. With regard to various functions carried by kidneys, from the results it is evident that only a few of the males and females residing in agency, rural and urban areas were not aware of the functions carried out by the kidney. Primary and secondary education, graduate and postgraduate respondents residing in agency areas had nil knowledge regarding the varied functions carried by kidney to lead a healthy life. Hence, there is a need to build awareness among the respondents of agency and rural areas of Visakhapatnam district about kidneys and their functions.

Even though kidneys have the ability to reabsorb nutrients, it is difficult for an individual to get away the waste products as kidneys cannot remove waste products. So, it is necessary to keep a watch on what we eat and drink to prevent further damage to kidneys. Keeping this in view, a survey was conducted to know the awareness of individuals regarding food habits and its risk on kidney failure. Majority of the male and female respondents of agency, rural and urban areas responded positively as to the risk of drinking tap or bore water whereas a few number of subjects was unaware of the risk. Most of the male and female respondents of the agency, rural and urban areas were not aware about the risk to kidneys caused by fast foods and only a few were aware of the risk to kidneys caused by fast foods consumption. Only a few rural males and female respondents of agency and rural areas responded to have knowledge about the risk to kidneys caused by adulterated foods while most of the others were unaware of the same. Majority of the respondents with primary and secondary education, graduates, postgraduates and the uneducated respondents in the agency, rural and urban areas were found to have awareness on kidney damage caused by water variations. Only a few of the respondents of rural, urban and agency areas, with primary, below secondary education, secondary education and the uneducated subjects replied to have awareness about the risk of fast food consumption on kidney damage. Most of the respondents of agency, rural and urban were unaware of the risk of adulterated foods, soft drinks and beverages on kidneys.

Awareness of the effect of pain killers on kidney damage showed most of agency, rural and urban male respondents were unaware of the consequence whereas only a few rural females were aware of the

outcome and others had no idea of the effect of pain killers on kidneys. A few numbers of rural male and female individuals were aware of snakebite and kidney damage and most of the others were unaware regarding this issue. Only a small percent of males and females respondents of rural area were reported to have awareness of indigenous or country medicine and kidney damage whereas in other areas like agency and urban, it was a naive response. Few of the respondents in agency and rural areas with primary and secondary education were aware of the effect of pain killers, snake bite, indigenous medicine and UTI on kidney damage. All other respondents replied having no idea about the ill effects of painkillers, snake bite, indigenous medicine and UTI. Even though the respondents are educated in three domiciles, there is only a little awareness about the risk caused by fast food consumption on kidney damage, effect of pain killers, snake bite, indigenous medicine and UTI on kidney damage. Hence, there is a need to create awareness among the respondents of three domiciles by undertaking community health education activities for creating alertness about health risk behaviors and health consequences regarding kidney problems.

Balwani *et al.*, [6] conducted awareness survey about kidney and its related function and dysfunction in school going children of the Central India and reported that more than 95% of children were aware that normally humans have two kidneys and around 50% of school children on an average were not aware of location of the kidneys. About 60%–75% of school going children was unaware of all the functions of a normal kidney and more than half of school children had no idea that even one normal kidney was sufficient to lead a normal life. More than half of the participant children were unaware of the basic symptoms of the kidney failure and around 8% - 9% of students reported a positive family history of kidney disease in their family. The researchers suggested that the pediatric population, especially the school going students be educated from their early years about the basics of any vital organ like the kidney.

Hussain *et al.*, [11] conducted a cross-sectional study at the out-patient department of Endocrinology, Hakeem Abdul Hameed Centenary (HAHC) Hospital, Jamia Hamdard, New Delhi, India during April 2017–May 2018. Among the total patients, only 33.43% of the subjects correctly recognized diabetes and hypertension as risk factors for CKD, whereas 44.27% were aware of the kidney's function. The study revealed that among the diabetics, only one third of the study participants recognized that hypertension and diabetes mellitus are risk factors of CKD. The researchers found statistically significant associations between kidney disease knowledge and education status. A cross-sectional study regarding the awareness of CKD among Tamil Nadu population revealed that the participants had ample knowledge of the risk factors, signs and symptoms of CKD and inadequate knowledge of the physiological function of the kidney and the diagnosis of CKD [7]. It has been reported that about 50% of the study population was aware of the signs and symptoms of kidney disease, on the other side, the general population of Indonesia had inappropriate knowledge on the symptoms, risk factors, diagnostic tools of CKD [5].

CONCLUSION

In the present study, the prevalence of CKD was found to be 2.4% among the three domiciles of Visakhapatnam district and the study distribution with an area of living showed rural people are significantly more affected than the others. Most of the agency and rural respondents were unaware about kidneys and their functions, risk of fast food consumption, effect of pain killers, snake bite, indigenous medicine and urinary tract infections on kidney damage. Chronic kidney disease is a problem of epidemic magnitude in India and with an increasing diabetes, hypertension and growing elderly population, it is going to increase even further. Although the exact burden of CKD in India is still not known, it is possible to estimate the prevalence and incidence of CKD by implementing preventive health policies and awareness programmes with limited resources. Identification of CKD in the early hours is important to delay the development of the disease which in turn decreases the economic burden on the individual, family and community. More studies are warranted to assess the CKD knowledge in a large population-based sample and to frame a CKD awareness model for high-risk patients as well as the general population in order to promote earlier diagnosis, better treatment and innovative care.

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