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Knowledge, attitudes & practices on chronic kidney disease among people of the north central province of Sri Lanka

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ABSTRACT

Chronic Kidney Disease of unknown etiology (CKDu) has become a major health issue of national interest in Sri Lanka. A significant number of patients with CKDu are from the north central province. Several research projects have been carried out to find out the etiology & risk factors of CKDu. The aim of our research was to assess the awareness of the disease among the people in the north central province of Sri Lanka. These findings will be important when formulating preventive measures. A descriptive cross sectional study conducted in the north central province of Sri Lanka. The sample size was 240. The data was collected from an interviewer administered questionnaire. Data was analyzed using SPSS. Descriptive data was presented as numbers and percentages and the differences between categories were checked with the chi-squared test. Out of 242 participants, 56.6% had poor level of knowledge regarding CKDu while 43.4% had good level of knowledge. Majority of the participants (60.3%) were following good practices to prevent the disease while the remaining 39.7% were not concerned about good practice methods. Attitudes were poor in 48.3% of the participants and satisfactory in the remaining 51.7%. Level of knowledge, attitudes and practices further varied according to the sociodemographic factors. The level of knowledge and attitudes regarding CKDu was not satisfactory since the majority of the participants were below the average standard. The safe practices and preventive measures taken by the participants were comparatively satisfactory since the majority had a good level of safe practicing to prevent the disease.

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INTRODUCTION

Chronic Kidney Disease of unknown etiology (CKDu) has become more prevalent over the last two decades. It is considered as a separate sub entity under the broad term of Chronic Kidney Disease (CKD). In Sri Lanka especially in the north central province there has been a significant increase in the number of cases diagnosed with chronic kidney disease of unknown origin [1]. Hence, the disease has become a major public health problem. The high cost in the management of end stage renal failure has led to a substantial burden on national health care resources. In this part of the world the management is even more difficult due to the lack of resources and restrictions in health care spending.

In other countries long standing chronic illnesses like diabetes and hypertension are the leading causes of chronic renal diseases. However, the majority of CKDu patients from the north central province of Sri Lanka do not show an association with any of those risk factor [2]. An interesting finding is the confinement of the disease to a specific geographical terrain within the country. North Central province where the major burden of CKDu is seen extends over 10530km^2 in Sri Lanka and belongs to the dry zone of the country. Majority of people live in this region, depend on farming for their livelihood. The disease mainly affects males from poor socioeconomic backgrounds who are involved in paddy farming. It has been argued that the exposure to certain environmental factors could be associated with the development of chronic kidney disease in this community [3, 4].

In 2009, the Sri Lankan Ministry of Health introduced criteria for case definition of CKDu [5]. These included:

(1) No past history of, or current treatment for diabetes mellitus or chronic and/or severe hypertension, snake bites, urological disease of known etiology or glomerulonephritis.

(2) Normal glycosylated hemoglobin levels (HbA1C < 6.5%).

(3) Blood pressure <160/100 mmHg untreated or <140/90 mmHg on up to two antihypertensive agents.

The CKDu is a slowly progressive disease. Majority of the patients were asymptomatic during the initial stage. The most important histopathological finding in renal biopsy specimens of the patients was tubulointerstitial damage. The interstitum showed a mononuclear cell infiltrate. Chronic kidney damage progressed over a period of time eventually leading to tubular atrophy, parenchymal scarring and glomerulosclerosis.6. Tubulointerstitial changes with negative immunofluorescence for IgG, IgM, IgA and C3 were in favour of a nephrotoxic etiology. However, the commonly known nephrotoxic substances such as lead, aminoglycosides, non-steroidal anti inflammatory drugs could not be linked to

the etiopathogenesis of this disease as the patients of CKDu have been generally well until late stages of the disease.

A number of scientists and the World Health Organization (WHO), have conducted research studies to determine the etiology of CKDu in the north central province of Sri Lanka. Researchers strongly believe that there are multiple factors contributing to CKDu [7]. The main factors include chronic exposure to arsenic [13], cadmium (Cd) [7] and pesticides [8]. Consumption of hard water, low water intake and exposure to high temperatures leading to dehydration, are among the other contributory factors. It has been found that there is a strong association between the geographic distribution of CKDu and the hardness of ground water [9]. Hardness of water is caused mainly due to the presence of the cations calcium (Ca), magnesium (Mg), strontium (Sr) and iron (Fe), together with carbonate, bicarbonate, sulphate and chloride anions [10,11]. The degree of hardness is classified as, soft, moderately hard, hard or very hard when the Ca and Mg content is 0–60 mg/L, 61–120 mg/L, 121–180 mg/L and >181 mg/L, respectively [12]. Ground water in the CKDu endemic area is found to be either hard or very hard and contains Ca, Mg, Fe and Sr ions [12]. Scientists have found that individuals who consume water from large water supply schemes, while living in the same endemic areas, do not have the disease.

It has been proposed that arsenic found in chemical fertilizers and pesticides when combined with calcium and/or magnesium in the ground water can ultimately damage the kidney tissues [13]. Even though there is considerable evidence to suggest that the agricultural workers in the CKDu endemic areas are exposed to arsenic, the exact source and mode of entry of arsenic remains controversial. Scientific data from different sources gives an insight in to this major problem that there is a strong association of environmental factors to the unique geographic distribution of this disease.

General objective

To assess the knowledge, attitudes and practices on CKDu among people in the north central province of Sri Lanka.

MATERIALS AND METHOD

A descriptive cross sectional study done in the north central province of Sri Lanka. People who were permanent residents in this province were included in the study. North central province was selected as there is a high prevalence of CKDu in this province when compared to other provinces.

Inclusion criteria:

Both males & females in the age group 18 – 65years and who are permanent residents in the north central province were selected.

Cluster sampling technique representative of the entire province was used.

Sample size:

Sample size was determined using the following equation.

$$n = Z^2\ 1\text{-}\alpha^2\ P\ (1\text{-}P) / d^2$$

n = required sample size

Z = Standard normal deviate for given significance for 95% CL it is 1.96

p = 0.1 since the expected proportion of target population is 10% with CKDu

d = Margin of error = 0.04

The sample size was determined as follows:

$n = 1.96^2\ 0.1(1\text{-}0.1) / 0.04^2$

n = 216.0625

non response rate expected is 10%

Final sample size is 216.0625 ×100/90 = 240.069

Total number of the study sample = 240

Informed written consent was obtained from all the participants. An interviewer administered questionnaire was used for data collection. Descriptive statistical methods were used to describe and present data. For categorical data Chi-square test and for continuous data T-Test was used. Chosen significant level was 0.05.

RESULTS AND DISCUSSION

Table 1: Frequency distribution of socio-demographic characteristics of the participants

Socio demographic variables	Number (n=242)	Percentage (%)
District		
• Anuradhapura	151	62.4
• Polonnaruwa	91	37.6
Village		
• Medawachchiya	50	20.7
• Shrawasthipura	50	20.7
• Medirigiriya	30	12.4
• Gallella	30	12.4
• Other	82	33.9
Duration of residence		
• <=10 yrs	30	12.4
• 11-25 yrs	62	25.6
• 26-40 yrs	75	31.0
• 41-55 yrs	39	16.1
• >55yrs	36	14.9
Mean = 32.97, median =32 , mode= 35 , SD = 17.91		
Sex		
• Male	131	54.1
• Female	111	45.9
Age		

• <=25 yrs	34	14
• 26-40 yrs	65	26.9
• 41-55 yrs	65	26.9
• >55 yrs	78	32.2
Mean = 45.01, median= 46.50, mode= 65, SD= 15.172		
Education level		
• Degree level	4	1.7
• AL	51	21.1
• OL	75	31.0
• Up to grade 8	54	22.3
• Below grade 8	58	24.0

Majority of the study population was from Anuradhapura district (62.4%) and majority of the participants were males (54.1%). Out of all the participants 63.6% were employed.

Table 2: Frequency distribution of knowledge among the participants

Employment		
• Employed	154	63.6
• Unemployed	88	36.4
Clinic attendance		
• Clinic	91	37.6
• Non clinic	151	62.4

Level of knowledge	Frequency	Percentage %
Poor knowledge	137	56.6
Good knowledge	105	43.4
Total	242	100
Mean = 59.93, median= 62.5, mode = 58, SD= 1.7483		

A score system was developed based on the answers given by the participants to assess the level of knowledge.

Mean-59.53

Median-62.5

Mode-58

SD-1.7483

Out of 242 people 137 (56.6%) had a poor level of knowledge on CKDu (score less than the mean) and 105 (43.4%) had a good level of knowledge (score more than the mean).

Table 3: Association between level of knowledge about CKDu & the duration of residency

Factor	**Level of knowledge**		**Significance**
	Poor knowledge	**Good knowledge**	
Duration of residence			
<=32 yrs	80 (58.4%)	42 (40%)	$X^2 = 8.045$, df
>32 yrs	57 (41.6%)	63 (60%)	=1,
Total	137(100%)	105(100%)	P value = 0.005

According to the collected data the mean duration of residency is 32 years. Out of the 122 people who have the duration of residence equal or less than 32 years, 80 participants had poor knowledge and 42 participants had good knowledge on CKDu. Out of the 120 participants who have lived in the north central province for more than 32 years 57 had poor knowledge and 63 had good knowledge. Since the p value is 0.005 there is a statistically significant association between the duration of residency and knowledge on CKDu.

Table 4: Association between level of knowledge about CKDu & age of the participants

Factor	Level of knowledge		Significance
	Poor knowledge	**Good knowledge**	
Age			
<=45 yrs	73 (53.3%)	45 (42.9%)	$X^2 = 2.587$, df
>45 yrs	64 (46.7%)	60 (57.1%)	=1,
Total	137(100%)	105(100%)	P value = 0.108

Since the mean age of the participants was 45, the sample was divided in to two groups above and below the age of 45 years. Out of 118 people less than 45 years of age, 73 had poor knowledge on CKDu and 45 people had good knowledge. Out of 124 people more than 45 years of age 64 people had poor knowledge and 60 people had good knowledge. The p value of 0.108 which is higher than 0.05 indicated that null hypotheses cannot be rejected and therefore the observed difference between the age and the level of knowledge can be due to by chance.

Table 5: Association between level of knowledge about CKDu & sex of the participants

Factor	**Level of knowledge**		**Significance**
	Poor knowledge	Good knowledge	
Sex			
Male	76 (55.5%)	55 (52.4%)	$X^2 = 0.229$, df =1,
Female	61 (44.5%)	50 (47.6%)	P value = 0.632
Total	137(100%)	105(100%)	

There were 131 male participants. Out of 131 male participants 76 had poor knowledge on CKDu and 55 had good knowledge. Out of the 101 female participants 61 had poor knowledge and 50 participants had good knowledge. In both males and females majority are having poor knowledge on CKDu. Out of all 137 of people who had poor knowledge majority (55.5%) are males. Out of 105 participants with good knowledge majority 55 (52.4%) are males. Since the p is 0.632 the null hypotheses cannot be rejected and the observed difference of knowledge in relation to sex can be by chance.

Table 6: Association between level of knowledge about CKDu & education level of the participants

Factor	Level of knowledge		Significance
	Poor knowledge	Good knowledge	
Education level			
<=OL	105 (76.6%)	82 (78.1%)	X^2 = 0.071, df =1,
>OL	32 (23.4%)	23 (21.9%)	P value = 0.789
Total	137(100%)	105(100%)	

When considering the level of knowledge according to the educational level, 76.6% of the participants who had poor knowledge regarding CKDu were educated up to or below the GCE ordinary level examination while the remaining 23.4% was educated beyond the ordinary level examination. 78.1% participants with good knowledge were educated up to or below the ordinary level examination and only 21.9% had an education beyond the ordinary level. The p value for these distributions is more than 0.05, therefore the differences seen in the distribution is not statistically significant.

Table 7: Association between level of knowledge and the employment

Factor	Level of knowledge		Significance
	Poor knowledge	**Good knowledge**	
Employment			
Employed	84 (61.3%)	70 (66.7%)	X^2 = 0.736, df =1,
Unemployed	53 (38.7%)	35 (33.3%)	P value = 0.391
Total	137(100%)	105(100%)	

Majority of people who are having good knowledge are employed (66.7%). In the category of poor knowledge also the majority (61.3%) was employed. The p value for this distribution is more than 0.05 therefore the null hypotheses cannot be rejected and no statistically significant difference in the distribution.

Table 8: Frequency distribution of safe practices in relation to CKDu

Practices	Frequency	Percentage %
Poor practices	96	39.7
Good practices	146	60.3
Total	242	100
Mean= 83.47, median =100 , mode= 100, SD= 2.43		

The mean score for practices was 83.47, median was 100 & the mode was 100. According to the above frequency distribution, 60.3% of the participants had good and evidence based practices in relation to CKDu.

Table 9: Association between practices and the duration of residence

Factor	Practices		Significance
	Poor practices	Good practices	
Duration of residence			
<=32 yrs	50 (52.1%)	72 (49.3%)	X^2 =0.178, df =1, P value = 0.673
>32 yrs	46 (47.9%)	74 (50.7%)	
Total	96(100%)	146(100%)	

The mean duration of residency was 32 years. In both categories of participants who were less or equal to the mean or more than the mean, good practices were more compared to the poor practices. p value of 0.673 is not statistically significant.

Table 10: Association between practices and the age of the participants

Factor	**Practices**		**Significance**
	Poor practices	Good practices	
Age			
<=45 yrs	53 (55.2%)	65 (44.5%)	X^2 = 2.648, df =1, P value = 0.104
>45 yrs	43 (44.8%)	81 (55.5%)	
Total	96(100%)	146(100%)	

Fifty three (55.2%) participants with poor practices were less or equal to 45 years (<=45) and 55.5% participants with good practices were >45 years of age. There is no statistically significant association as the p value is >0.05.

Table 11: Association between practices and the sex of the participants

Factor	**Practices**		**Significance**
	Poor practices	Good practices	
Sex			X^2 = 0.065, df =1, P value = 0.799
Male	51 (53.1%)	80 (54.8%)	
Female	45 (46.9%)	66 (45.2%)	
Total	96(100%)	146(100%)	

Among all the participants both good and poor practices are more in males. But this difference is not statically significant as the p value is 0.799.

Table 12: Association between practices and the education level of the participants

Factor	**Practices**		**Significance**
	Poor practices	Good practices	
Education level			X^2 = 5.071, df =1, P value = 0.024
<=OL	67 (69.8%)	120 (82.2%)	
>OL	29 (30.2%)	26 (17.8%)	
Total	96(100%)	146(100%)	

According to above table 69.8% of participants with poor practices have an education level below or up to ordinary level while 82.2% of participants with good practices also have an

education level below or up to ordinary level. The difference seen in this table is statistically significant because the p value is less than 0.05.

Table 13: Association between practices and employment of the participants

Factor	Practices		Significance
	Poor practices	Good practices	
Employment			$X^2 = 0.272$, df =1, P value = 0.602
Employed	63 (65.6%)	91 (62.3%)	
Unemployed	33 (34.4%)	55(37.7%)	
Total	96(100%)	146(100%)	

Among the participants who had good practices 62.3% were employed and 37.7% were unemployed. Among the participants who had poor practices 65.6% were employed and 34.4% were unemployed. p value was > 0.05. Therefore the differences which are shown in the table are not statistically significant.

Table 14: Frequency distribution of attitudes about CKDu

Attitude	Frequency	Percentage %
Poor attitudes	125	51.7
Good attitudes	117	48.3
Total	242	100
Mean = 60.69, median= 60.00, mode= 62.86 SD= 7.00		

The attitudes of the participants on CKDu are shown above. Out of the entire study population 51.7% had poor attitudes and 48.3% had good attitudes regarding CKDu.

Table 15: Association between attitudes and duration of residency of the participants

Factor	Attitudes		Significance
	Poor attitudes	Good attitudes	
Duration of residence			
<=32 yrs	67 (53.6%)	55 (47.0%)	$X^2 = 1.050$, df =1, P value = 0.305
>32 yrs	58 (46.4%)	62 (53.0%)	
Total	125(100%)	117(100%)	

Out of 125 participants with poor attitudes, 67 people (53.6%) are equal or have been residents for 32 years or a lesser period, while 58 participants (46.4%) have been residents for more than 32 years. Out of the 117 participants with good attitudes, 55 participants (47%) have been residents for 32 years or a lesser period of time, while 62 participants (53%) have been residents for more than 32 years . The p value is more than 0.05 and therefore there is no statistically significant association between the attitudes and age. This difference may be due to chance.

Table 16: Association between attitudes about CKDu and the age of the participants

Factor	Attitudes		Significance
	Poor attitudes	Good attitudes	
Age			
<=45 yrs	67 (53.6%)	51 (43.6%)	X^2 = 2.424, df =1, P value = 0.120
>45 yrs	58 (46.4%)	66 (56.4%)	
Total	125(100%)	117(100%)	

Out of the 125 participants with poor attitudes, 67 people (53.6%) were less than 45 years , while 58 participants (48.8%) were more than 45 years .Out of 117 participants with good attitudes, 51 participants (43.6%) were less than 45 years, while 66 participants (56.4%) were more than 45 years. The p value for this sample was more than 0.05, therefore there is no statistically significant association between the attitudes and age. This difference may be due to chance.

Table 17: Association between attitudes about CKDu and sex of the participants

Factor	Attitudes		Significance
	Poor attitudes	**Good attitudes**	
Sex			X^2 = 0.895, df=1, P value = 0.344
Male	64 (51.2%)	67 (57.3%)	
Female	61 (48.8%)	50 (42.7%)	
Total	125(100%)	117(100%)	

Out of 125 participants with poor attitudes, 64 people (51.2%) were males, while 61 participants (48.8%) were females .Out of 117 participants with good attitudes, 67 participants (57.3%) were males, while 50 participants (42,7%) were females. The p value for this sample did not show any statistically significant association between the attitudes and sex. This difference may be due to chance.

Table 18: Association between attitudes and the education level of the participants

Factor	Attitudes		Significance
	Poor attitudes	**Good attitudes**	
Education level			X^2 = 4.039, df =1, P value = 0.043
<= OL	90 (72.0%)	97 (82.9%)	
>OL	35 (28.0%)	20 (17.1%)	
Total	125(100%)	117(100%)	

Out of 125 participants with poor attitudes, 90 people (72%) were educated up to or below the ordinary level and 35 participants (28%) were educated more than the ordinary level. Out of 117 participants with good attitudes, 97 participants (82.9%) were educated up to or below the ordinary level and 20 participants (17.1%) were educated more than the ordinary level. The p value for this sample was less than 0.05, therefore there is a statistically significant association between their attitudes and the educational level.

Table 19: Association between attitudes about CKDu and the employment of the participants

Factor	Attitudes		Significance
	Poor attitudes	Good attitudes	
Employment			
Employed	82 (65.6%)	72 (61.5%)	$X^2 = 0.431$, df =1, P value = 0.512
Unemployed	43 (34.4%)	45 (38.5%)	
Total	125(100%)	117(100%)	

Out of 125 participants with poor attitudes, 82 people (65.6%) were employed, while 43 participants (34.4%) were unemployed. Out of 117 participants with good attitudes, 72 participants (61.5%) were employed, while 45 participants (38.5%) were unemployed. The p value for this sample was more than 0.05. Therefore, there is no statistically significant association between their attitudes and employment & the difference is likely to be due to chance.

DISCUSSION:

The aim of our research was to analyze the knowledge, attitudes, and practices on CKDu in the people of the north central province of Sri Lanka. Informed written consent was obtained prior to the commencement of the study. An interviewer administered questionnaire was distributed among the total number of 242 participants.

Majority of the participants were males (54.1%). The age group between 55 to 65 years had the most number of participants (32.2%). Participants knowledge regarding CKDu was assessed by a set of questions covering the areas such as common symptoms, risk factors and preventive measures of CKDu. Common symptoms of CKDu include oedema, nocturia, confusion, pallor, lethargy, skin pigmentation, anorexia & paraesthesia. The risk factors associated with CKDu include family history of CKDu, living in an endemic area, paddy cultivation, use of pesticides, consumption of well water, past history of snake bite, consumption of fresh fish from water reservoirs in the area, & use of native treatment. Preventive measures that should be practiced include consumption of boiled and filtered water and wearing personal protective equipment when handling pesticides.

People who have been living in this area for more than 32 years had good knowledge on CKDu than the people who have been living for less than 32 years. Participants more than 45 years of age had a good knowledge than the participants less than 45 years of age. People who lived for a longer period and who were more than 45 years have more experiences in life than the rest of the community. Knowledge of the male participants was better than the females. Participants who have studied up to or less than the ordinary level have poor knowledge (76.6%) than the participants who have studied beyond the ordinary level

examination. People who were employed had good knowledge (66.7%) than the participants who were unemployed.

To assess the level of good practices following factors were taken in to consideration. Use of boiled and filtered water for drinking, use of personal protective equipment, use of organic fertilizers and dietary restrictions etc. In the study population 60.3% of the participants were following good practices. Good practices among the people who have lived for more than 32 years were more than the people who have lived for less than 32 years. Good practices were more among the people above 45 years of age than the participants less than 45 years of age. There was positive correlation between the higher level of education and good practices. Good practices were also more common in the participants who were employed.

Attitudes on CKDu were assessed by a specific set of questions included in the questionnaire. A score was assigned to each answer. Attitudes included questions in relation to the disease prognosis, treatment modalities, early detection & prevention and health care facilities provided by the public and private sectors. Participants with a higher level of education, who have been in the endemic area for a longer period and who were more than 45 years of age had good attitudes when compared with the respective groups.

Following were some views of the participants about the disease;

- Majority mentioned that the disease was non-curable.
- Some believe that native treatments was good for the initial stage and western medicine is good for the later stages of the disease.
- Shortage of facilities and drugs in the public sector hospitals.
- Lack of health education programmes.
- Shortage of safe drinking water for the people residing in endemic areas.
- Non -availability of organic fertilizers.
- Lack of knowledge about agrochemicals.

CONCLUSION

The increase in the number of CKDu patients from the north central province of Sri Lanka has become a major health problem of national concern. The prevalence of the disease is largely unknown due to the lack of epidemiological studies. As the disease is confined to a particular area of the country and the fact that it is more prevalent in the farming community suggest that there are environmental nephrotoxins associated with the etiopathogenesis of CKDu [14]. The possible environmental contaminants in soil-water-plant systems in the CKDu region should be studied in depth to arrive at evidence based conclusions. In 2008 the world health organization together with the ministry of health care and nutrition launched the

national research programme for CKDu. In addition there are independent research teams working together to find scientific information that would be of use to control the disease.

Aim of our study was to assess the knowledge, attitudes and practices on CKDu of people living in the north central province of Sri Lanka. Results revealed that the level of knowledge and attitudes regarding CKDu were unsatisfactory as the majority of participants were below the average standard. However, the safe practices and preventive measures adopted by the participants were comparatively satisfactory. We hope to conclude by suggesting to continue more advanced studies on this topic which will be of use to the people of this region [15].

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