

Identify the unknown causes for chronic kidney disease and the risks of death in Galewela Divisional Secretariat Division.

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Abstract

Kidney damages cause for the decrease in the body function longer than three months is called Chronic Kidney Disease (CKD). This disease affects several millions of people worldwide every year, including Sri Lanka. Approximately 1 in 10 people around the world have been affected with chronic kidney disease, and also young people are suffering from it. In Sri Lanka, chronic kidney disease of unknown aetiology (CKDU) has become a major health issue over the past two decades. This is a different form of kidney disease, which is not associated with conventional risk factors. According to that the study area is facing the CKDU problem since decades ago. Galewela D.S Division has selected as the study area. Main objective of this research is to identify the hidden causes for the chronic kidney disease (CKDU) and risk of death. Sub objective is to give suggestions to prevent the disease. Both primary and secondary data was used to analyse the results. Interviews and observations are the primary data collection sources. There are some secondary data and information collected for further analysis. There are plenty of causes have been identified for the chronic kidney diseases. As a result, there are many unknown reasons have been found through primary data collection and analysis. There are approximately 578 affected people identified diagnosed with kidney disease in the Galewela DS Division. Usage of pesticides, contaminated water. Drugs and cadmium concentrated water are the identified major cause of the unknown causative factors. Eventually the study says the CKDU is a major problem in Galewela DS Division. To prevent from the disease there are some suggestions and recommendation given. Being environment friendly means Living healthy.

Key words:Chronic, Diseases, Kidney, Risk, vulnerability

1.Introduction

Being healthy means the wealthier life of individuals. Therefore, each person risks at his best to take care of his health. Though the modern world has so many medications for the protection of life, the human witness more chronic diseases. Chronic kidney disease is one of the most identified diseases around the world. Many factors cause this chronic disease such as human activities, physical activities, genetic pass and lifestyle.

Several millions of people are affected by the kidney disease worldwide every year including Sri Lanka. Approximately 1 in 10 people around the world have been diagnosed with chronic kidney disease, also young people are not an exception. The main causes and risk factors of kidney disease are diabetes and high blood pressure (also known as hypertension). Bacteria, kidney stones, toxic chemicals are possible sources of kidney damage.

In Sri Lanka, chronic kidney disease of unknown aetiology (CKDu) has become a major health issue over the past two decades. This is different form of kidney disease, which is not associated with conventional risk factors such as diabetes and hypertension. The root cause of CKDu has not been definitively established yet. Hence, it is referred to as 'CKD unknown or uncertain aetiology'. Initially it is affecting several rural communities around North Central and Uva Provinces of Sri Lanka, This disease now prevalent in North Western, Eastern, Southern and Central provinces, and parts of the Northern peninsula. Approximately 15% of the population in Anuradhapura, Polonnaruwa and Badulla Districts between the age group 15-70 years are affected by CKDu (WHO, 2017). Although majority of those affected are male who are engaged in paddy

farmers and agricultural labourers, there is a growing number of women and children being affected by this disease. The World Health Organization (WHO) believes that this unknown CKD is an environmental-exposure disease caused by multiple factors such as chronic exposure to kidney damaging pesticides, arsenic, lead, cadmium, poor diet and genetic susceptibility to kidney failure. It is also in Nicaragua, El Salvador & even India. It is now being increasingly recognised as chronic agrochemical related Kidney disease. Developing country like Sri Lanka might have different aspect in this disease.

The Galewela divisional secretariat division (DSD) is selected as the study area which is located in Matale district of central province. The study area is widely facing chronic kidney diseases. Patients are increased in number in that area yearly (DS Report, 2016). Since the study area is highly engaged in agricultural activities, the risk of CK disease is high. It is one of the major problem in the study area now a days. The population of Galewela DSD was 61842(2001), 70042(2012) (Population census bureau, 2001-2012). There are 59 GramaNiladari divisions (GND). Study area is located north west of the Matale district having an area of 192.04 km. Economic patterns of the study area is based on agriculture. Main objective of this research is to identify the hidden causes for the chronic kidney disease (CKDU) and risk of death. sub objective is to give suggestions to prevent from the disease.

The study area is located North West of the Matale District having an area of 192.04 km². North part of the study area is bounded by the Palagala Divisional Secretariat, South by the Pallepola Divisional Secretariat and the West by the Ibbagamuwa and Polpitiyawa Divisional Secretariat area. Study area is located at a distance of 135km from Colombo on the Colombo Trincomalee road.

The economic patterns of the Galewela Divisional Secretariat Division is based on agriculture. 42% of the population is engaged in agriculture. According to the climate data of the study area, the average temperature is between 25°C and 26°C and the annual rainfall is in between 2000 to 2500mm. The most of the rainfall is received during North Eastern Monsoon.

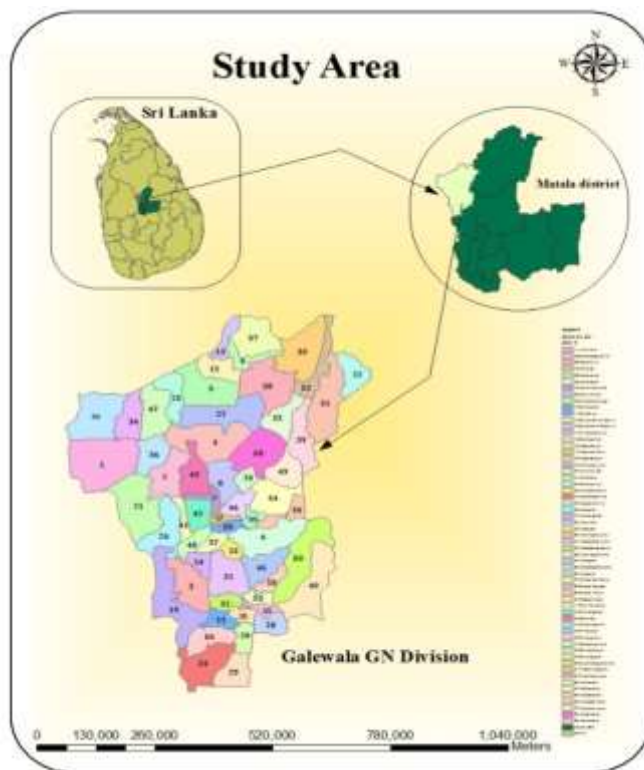


Fig. 1: Spatial Location of the study area

2.Literature review

Myles et al, (2014). have conducted a research under the topic of“Chronic Kidney Disease of Unknown Aetiology in Sri Lanka: Quest for Understanding and Global Implications”In this study it has been discussed about chronic kidney disease in Sri Lanka. Main objective of this research is identifying the causing factors of the CKD in Sri Lanka. According to the findings CKDu was first reported in Sri Lanka in the early 1990s, and over the last 10 years its prevalence has progressively increased to epidemic levels.8 its population prevalence in the dry zone provinces is now estimated to be over 15% for men. Primary and secondary data were used as a methodology in this research.

Senakaet al, (2018). have done a research under the topic of chronic kidney disease of unknown aetiology in Sri Lanka. It has been discussed about chronic kidney disease in Sri Lanka. Objective of this research is find the factors of chronic kidney disease in affected areas in Sri Lanka. A systematic literature review in PubMed, Embase, Scopus, and Lilacs databases identified 46 eligible peer reviewed articles and one conference abstract

were used as research method. As a results Geographical mapping indicates a relationship between CKDu and agricultural irrigation water sources. Health mapping studies, human biological studies, and environment-based studies has explored possible causative agents. Most studies focused on likely causative agents related to agricultural practices, geographical distribution based on the prevalence and incidence of CKDu, and contaminants identified in drinking water.

Sunil, (2015). Has conducted a research under the title of “Agrochemicals and Chronic Kidney Disease of Multi-Factorial Origin (CKDmfo): An Environmentally Induced, Occupational Exposure Disease”. Main objective is identifying the agrochemical factors that are causing chronic kidney disease in Sri Lanka. The discussion says the contamination of food and water through waste and agricultural runoff poses serious threats to humans. Pollution with microbes causes noticeable diarrheal diseases, whereas agrochemicals, heavy metals, fluoride, and toxins cause insidious diseases and premature deaths. A number of agents and toxins have been postulated as the cause of CKD of multifactorial origin (CKDmfo/CKDuo), including heavy metals, agrochemicals, fluoride, fungal and bacterial toxins, climate change; and a number of behavioural factors. Certain maps were used in the methodology part.

Jayasinghe(2011), “Chronic kidney disease ,risk factor identification”. In this report, maximum available risk factors are going analysis according to available secondary data which already have published in Sri Lanka. as well in other countries. The main objective and target of this report is to identify the maximum numbers of imaginative or possible causal factors for this disease according to the available secondary data, with related to Sri Lankan condition and also try to find out similar conditions in global scenario. Final outcome of this secondary data analysis will be helpful to the students who are interesting field like this and researchers who are going to implement their research related to CKDu in different disciplinarians.

3. Materials and Methods

Both the primary and secondary data collection method and material were used for this research. Primary data collection is must for the identification of the causes. Therefore, primary data collection such as interviews and field observations have been done in the study area.

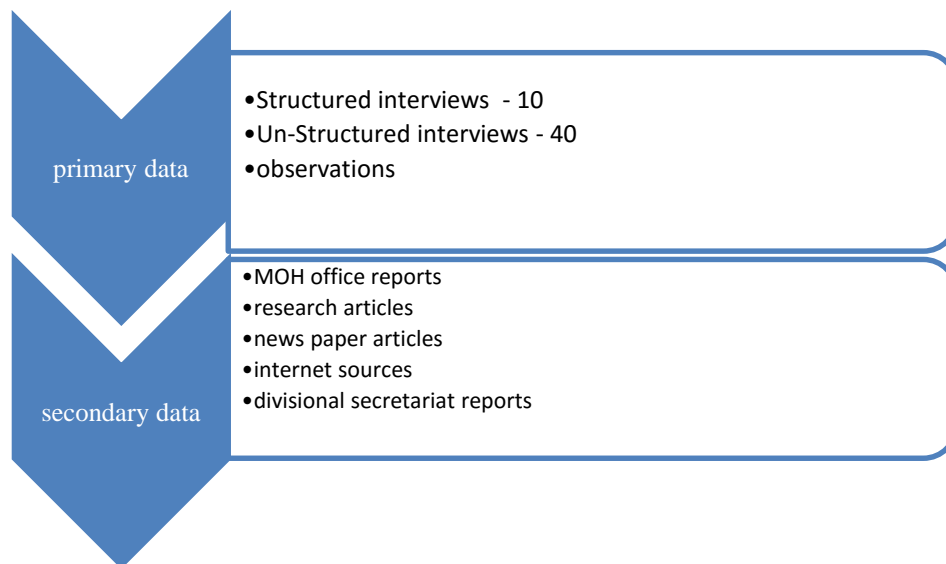


Fig. 2: Flow chart for methodology

3.1 Primary data collection

Structured interviews carried out with the GN and DS officers, Medical Officer of Health (MOH) officers, General hospital doctors and Elderly people who are living in the study area since their birth. As well as unstructured interviews have been carried out among the village local community. In that local community diagnosed people by Kidney diseases, their relatives and neighbours have been included. Field observation

were used to collect the virtual data and spatial related data. Structured interviews done with the selective sampling method and Un-Structured interviews have been done with the snowball and random sampling methods. According to their interviews the reasons of Chronic Kidney Disease were identified. As well as, through the observation also materials were received.

3.2.Secondary data collection

The secondary data collected from the following sources.

- Research articles
- MOH office reports(Galewela)
- Galewela DS office reports
- Galewela General Hospital
- Newspaper articles
- Journals
- Internet sources
- Kidney disease reports

3.3.Data analysis

The collected data have been analysed for the effective output and representation. Therefore, Arc GIS 10.3, Ms word and Excel 2013 have been used for the integration of data.

4.Results and Discussion

Table 1. Identified affected people

Checked people	Amount of people want to check	Affected people
59670	38000	578

According to the primary and secondary data process, there are some fruitful come gathered. There are 578 affected people by kidney disease in the Galewela DS Division.59,670 people have been checked up until now, also 38,000 people are yet remaining for the check-up (Galewela hospital record, 2017).

There are some causes found out through the interview and secondary data collection. Those identified reasons and causes have been analysed and examined for an appropriate results.

4.1Pesticides and fertilizers

Sri Lanka is an agricultural country. Most of the people do farming as their livelihood. Also people those who are living in the CKDu distributed area. They are doing mainly agriculture. Most of them do the paddy cultivation. So the usage of agrochemicals such as pesticides and fertilizers are high in these areas. According to that findings say the usages of agrochemicals are high in the study area. Through the interviews this result was gotten. Because the agriculture activities are high in the study area. Chemical fertilizers are play big role in supplying large number of heavy metal to the soil or water eco system. In the study area paddy fields are located near to the water bodies. Through the usage of fertilizers they release the heavy metals to the soil and water. It leads to the human health.

4.2 Shortage of safe drinking water

Table 2: Sources of water

Source of Water	Quantity
Protected wells	2154
Unprotected wells	246
Tap water	40
Tube wells	243
River tanks	70
Other sources	316
Total of sources	3069

This table shows the drinking water sources of Galewela area. Through this table we can identify safe drinking sources and the shortage of drinking sources. There is a problem in safe drinking water in the study area. Because the Galewela D.S. Division area is reported as an agricultural dominant geographical area. Through the agricultural and some other pollution activities water being contaminated. When the interviews were conducted with health officers and some people they said the study area has facing the unsafe drinking water crisis. It may be one of the cause to the prevalence of CKDu.

4.3. Cadmium level

Cadmium can be identified as one of main heavy metal for water pollution. According to the world health organization (WHO), Cadmium level in unpolluted natural water is below the 1µg/L (Micro orgasm per litre). Contamination of drinking-water may occur as a presence of cadmium. Sometimes there is a high level of cadmium in shallow wells than the deep wells. Because top soil layer may have the high acidify than the down layers. Sri Lanka is using the wells for the irrigation and drinking purposes. According to the interviews the PHA officer said the cadmium level of water is one of the threaten factor to the CKDu in the study area. Also pH level is Leading to the cadmium level in drinking water.

Also in the study area food is the main source of cadmium. Crops grown in polluted soil or irrigated with polluted water may contain increased concentrations. Smoking is one of outside factor is directly impact on increase the level of cadmium in human blood. So final result is through these level of cadmium in human blood may increase. It can be leads to CKDu in Galewela DS Division.

4.4. Alcohol usage

Alcohol is regular beverage within Sri Lankan farming community. Illegally alcohol is most famous in the study area. Consuming too much of alcohol which produced illegally, can affect the immune system of a person. Also it can cause heart disease, liver disease, high blood pressure and kidney disease. Drinking alcohol leads to damage kidney cells and changing the structure and function of the kidneys. According to the interviews the result has gotten number of alcohol consumers who have been affected by the CKDu disease in the study area.

4.5. Arsenic level in water

The world health organization says the recommended level of arsenic in the drinking water is 10µg/L. they say it through their scientific evidence. But according to the Sri Lankan findings the level of arsenic in the drinking water is 100 – 200 µg/L. It is very too much. The arsenic level of the drinking water is high in the study area. According to the MOH office reports, statistics and interviews this result was gotten. Agro chemicals are the reason to the high level of arsenic of drinking water in Sri Lanka including study area. Agrochemical and pesticide can include Arsenic as an element. Through the variety of cultivation usage of agro chemicals high in the study area. heavy metals and minerals of the agro chemicals are leading to the high level of arsenic in the safe drinking water.

4.6 Diabetes and pressure

According to the interview with the Health officer of Galewela he said that “People those who are having high blood pressure and high blood sugar are more susceptible for Chronic Kidney Disease (CKDu). The elevated levels of blood glucose leads to an increased strain on the nephrons of the kidneys when it filtering blood. Hypertension (pressure) damages the blood vessels and may lead to a reduced blood flow to kidneys”. According to the interview with the MOH officer of Galewela he said some of the CKDu affected people in this area that they are having the high blood pressure and the high blood sugar.

4.7 Herbal medicine

Through some secondary data say that there are some researches finding in Taiwan and China about herbal medicine impact to the CKDu. Also in Sri Lanka there is a big discussion is ongoing about this.. Because Most of herbal medicine are not producing proper manner and also sometime herbal medicine producer may not be known chemical contain of the ingredients so there are possibility to produce toxic compounds within the herbal medicine. In Galewela area many herbal medicines are available. Also many people are providing the herbal medicine treatment. this area is one of the famous place for the herbal medicine treatment. According to the interview with the MOH officer he said it may be a one of causing factor to the CKDu in Galewela region.

4.8 Fluoride

The secondary data sources say Fluoride is the one major element which is dissolves in dry zone water bodies in Sri Lanka. So, it may be a leading factor to the CKDu in Sri Lanka including the study area. World Health Organization (WHO) defined 1.5 mg per liter of Fluoride concentration as the safe level for drinking. But in Sri Lanka’s water we can see this level is too much. Some dry zones have 5mg per liter in the drinking water. In Sri Lanka majority of people use ground water as main water source for their drinking purpose. In rural areas the people use the ground water through the wells and tube wells. Therefore, many wells can be noticeable in the study area which built to extract the ground water. Here fluoride level of water is very high. Because of the unsafe drinking water facilities, there is a risk to the CKDu in Galewela study area. safe drinking water is affected by this fluoride level. This problem is continuously happening in the study area.

The village people have less awareness regarding the issue and causes of Chronic Kidney Disease. Since the area is a developing and agriculture based region, most of the people are not well educated and do not have much knowledge in the medical sectors. As per the unstructured interview, local people stated that 70% of people are unaware about the disease and only 30% of the people are aware about the chronic disease.

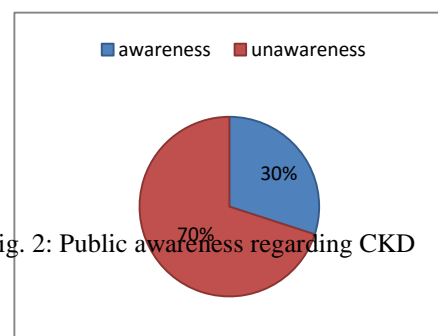


Fig. 2: Public awareness regarding CKD

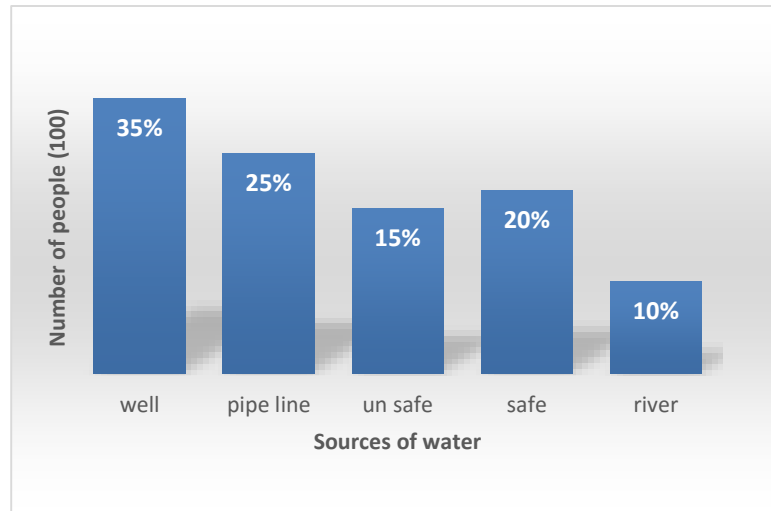


Fig. 3: Consumption of drinking water

All the native people from the study area do not have safe drinking water facilities. As per the interview with the local people most of them are consuming unhygienic water. only 20% people are having safe water facilities. As well as, the people retrieving water from well, pipeline are higher than the other people who are consuming water from various sources. 15% of people consuming unsafe water from ponds, lakes, small and temporary water bodies and springs. These shortcoming about their health issue leads to the chronic diseases such as Kidney disease.

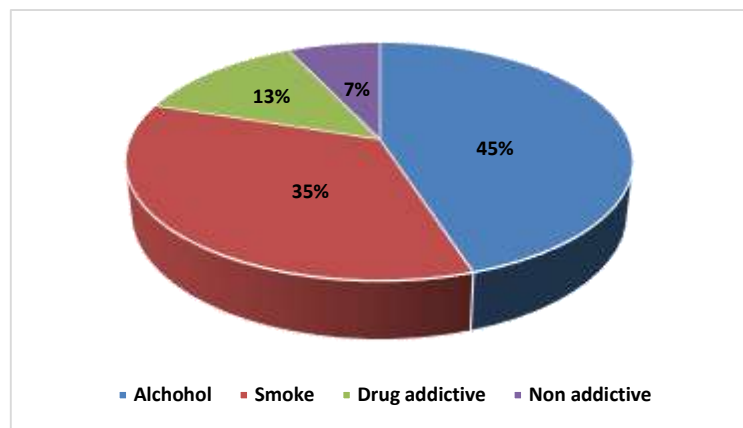


Fig. 4: Addictive & Non addictive population

In the Figure no 4, it is more obvious that most of the village people are addictive to any types of alcoholic beverages. The information gathered from both structured and un structured interviews. The doctors say, this study area highly populated with un intellectual and drug addictive population. Therefore, the risk of CKD affect is high in chance.

5. Conclusion

A large and growing number of Sri Lankans suffer from chronic kidney disease and CKDu. We can see the rapid increase of chronic kidney disease of unknown in our country from the 1990 s. People from several parts in Sri Lanka have been affected by the CKDu. As per the report given by the doctors in the Galewela General Hospital, the cause of the disease is depended on the sanitation of the study area people. Due to the lack of hospitality, improper sanitation and lifestyle, unhealthy food behaviours causes the disease widely.

To prevent the level of this disease some prevention activities want to be implemented. Through awareness programs by the health centres and hospitals, it could be able to mitigate the chronic kidney disease in the study area. For this process from 2014 CKD project is happening in the study area. Therefore, each year people are being checked up by in the general hospital. Galewela MOH office is doing this work. By the test of blood and urine, they identify the affected people. Most of the village people are un educated farmers. So, their agriculture practices lead them to suffer.

Other recommendations are to mitigate this disease:

- Decrease the pesticides usage
- Avoiding alcohol
- Maintaining a healthy weight for your height by daily physical activity and reducing calories
- Drinking safety water.
- Avoiding smoking
- Managing the medical conditions.
- Getting regular kidney disease tests for patients who are at risk
- Avoiding excessive use of certain medicines
- Eating fresh fruit and vegetables
- Drinking 8 glasses of water a day.
- Awareness programmes.

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7. Reference

- Alwis K .Chronic Kidney disease (2013 Aug 10) National academy of science, Colombo Sri Lanka, available from <http://nas-srilanka.org.p=599>
- Jayasumana C, Gajanayake.R, Siribaddhana (2014), importance of arsenic and pesticides in epidemic Chronic Kidney disease in Sri Lanka, BMC nephrology.
- Jayathilaka N & etc (2013) Chronic Kidney disease of uncertain aetiology; Prevalence and causative factors in a developing country: BMC Nephrology, National Research project team,
- Jayasingha Y.K.R.T. (2011), Chronic Kidney disease Risk factor identification.
- Marvin Gonzalez& etc (August 2018) , What do epidemiological studies tell us about chronic kidney disease of undetermined cause in Meso America, clinical kidney journal, volume 11,issue 04 pages 496-506
- Myles & etc (May 2014), Chronic Kidney disease of unknown Aetiology in Sri Lanka: Quest for understand and global implications, RTI press journal.
- Senaka Rajapaksa & etc. (2018), Chronic Kidney disease of unknown aetiology in Sri Lanka.
- Sunethra kanth (December 2014) , chronic kidney disease in Sri Lanka-current research evidence justification, Sabragamuva university journal , volume 13, issue 02, pages 31- 58
- Sunil Wimalawansa J. (2015), Agrochemicals and Chronic Kidney Disease Multi factorial: An Environmentally induced. Occupational exposure disease, international journal of nephrology and kidney failure, volume 1.3
- Sunil W.A (5 march 2014), Chronic Kidney disease spreads in rural Sri Lanka, world socialist website.
- Victorian B (2008) among farmers in Sri Lanka Kidney disease on the rise: environmental causes being considered, Nephrology times.

Wasantha Subasingha (2014), Reasons and social effects of Chronic Kidney disease Patients in North Central Province Sri Lanka (with special reference to Padawiya area), research journal of medical science, Sri Lanka, volume 8