

## Burden of Renal failure among adults in Rural Kerala: A community based study

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### Abstract

**Background:** Renal failure is becoming a major health problem among adults in Kerala where there is high prevalence of diabetes and hypertension. Exact prevalence of this health problem in Kerala is not available.

**Objectives:** Study is done to estimate the burden of diagnosed cases renal failure among adult population.

**Materials and Methods:** Houses were selected by systematic random sampling in Vettathoor Panchayat to obtain an estimated sample of 735 adults above the age of 20 assuming the prevalence of renal failure as 2%. Data was collected from all adults in the selected houses by trained interns. Renal failure was identified on the basis of history and health records available with the household. Only already diagnosed cases could be identified and hence will not include early stages which are not diagnosed.

**Results:** The prevalence of any stage of chronic renal failure was 4.8% and renal failure was 3.6% of adult population. Hypertension and diabetes which increases the risk for chronic renal disease are present in most of the cases and the risk was many times more when both were present (adjusted odds ratio = 22.3).

**Conclusion:** The burden of renal failure is high in the rural community studied and diabetes and hypertension are associated with renal disease in most of the cases.

### Introduction

With increasing proportion of elderly people and increasing prevalence of chronic non communicable diseases, Chronic Renal Diseases also has become a major Health Problem in India. With high burden of diabetes and uncontrolled hypertension, renal failures are likely to be on the increase. In presence of Chronic kidney disease (CKD) other non-communicable diseases like diabetes and hypertension have poor health outcomes. The presence of CKD increases cardiovascular mortality several folds.<sup>(1,2)</sup> Globally the prevalence of CKD including its milder forms is about 5-7% and is likely to be more in developing countries.<sup>(1)</sup> CKD when not detected or ignored progresses to End Stage Renal disease (ESRD) or Renal failure which necessitates Renal Replacement Therapy (RRT) in the form of dialysis or renal transplantation which are costly. The exact prevalence of this chronic problem is not clear in many part of India. Community based studies designed to detect advanced stages of chronic kidney disease has shown lower prevalence and screening studies which detect all stages show higher prevalence.<sup>(3)</sup> Diabetes and hypertension are shown to have higher prevalence in Kerala state.<sup>(4)</sup> Hospital records also show large number of cases on dialysis for renal failure. Since Kerala has proportionately larger number of elderly people the prevalence of CKD is also likely to be on the higher side. Hence it is likely that chronic renal failure is real burden in the state. Chronic kidney disease (CKD) is gradual in progress and is described in five stages according to the severity depending on glomerular filtration rate (GFR). A community based study was conducted to know the prevalence of the already diagnosed cases of renal failure in a rural area in northern Kerala namely Vettathoor. The earlier stages of CKD are difficult to

detect in a community based study and hence this study attempts to reveal the end stages of the disease which often remain diagnosed because of accompanying severe health problems.

### Objectives

The study was conducted with the objective (1) to find out the proportion of subjects living with renal failure among rural adult population in the study area and (2) to assess the known risk factors among the people with renal failure.

### Materials and Methods

A community based cross sectional study was undertaken among the adult population (above 20 years) of Vettathoor Panchayat, a rural population in northern Kerala, India, during 2 months period from June July 2015. To estimate sample size required the prevalence of chronic renal failure was taken as 2% and allowing for an error of 20% and design effect the calculated sample size was 735. A systematic random sampling technique was adopted to get a sample of houses for getting the above number of adults based on average family size and using the family registers available with the panchayat office as a sample frame. For the purpose of the study renal failure was defined as those cases which were diagnosed as renal failure from a tertiary care hospital or are on dialysis for renal disease. Data was collected by a group of interns of MES Medical College, who were trained for this purpose. They visited the houses identified by systematic random sampling and collected data from the household. Their demographic characteristics were recorded on a predesigned structured format. Height, weight and blood pressure were measured and recorded. The subjects were interviewed for additional data on

other health problems and treatment history. Data was entered on Microsoft excel format and analysed using a trial version of SPSS programme.

## Results

The study collected data from 946 and adults the demographic characteristics of the population studied are depicted in Table 1. The mean age was 47.1. The mean age of those with renal failure was 57.8. The mean age of end stage renal disease in India is around 50 years and that in the developed countries is 20 years more.<sup>(5)</sup> The results show that among the 946 adults above age 18 studied, 46 persons (4.86%) were diagnosed to have any stage of chronic kidney disease and 34 were diagnosed as renal failure giving a prevalence of 3.6 percent. This prevalence had no significant difference between males and females. The prevalence increases as age increase as is evident from Table 2. There were no cases of renal failure among people 20 yrs and below but among people above 80 yrs the prevalence was 15.4%. Among the 46 persons who were diagnosed to have any stage of chronic renal disease the cause as determined by the treating tertiary care centre was analysed and diabetes is the major cause informed by treating hospital followed by hypertension as depicted in Fig. 1.

**Table 1: Demographic Characteristics of the Population**

| Variable             |         | Frequency | Percent |
|----------------------|---------|-----------|---------|
| Age Group            | 21-30   | 180       | 19.1    |
|                      | 31-40   | 187       | 19.8    |
|                      | 41-50   | 219       | 23.2    |
|                      | 51-60   | 185       | 19.5    |
|                      | 61-70   | 109       | 11.5    |
|                      | 70-80   | 53        | 5.6     |
|                      | 81-90   | 13        | 1.4     |
|                      | total   | 946       | 100.0   |
| Gender               | Females | 464       | 49.0    |
|                      | Males   | 482       | 51.0    |
|                      | total   | 946       | 100.0   |
| Socio-Economic Class | 1       | 94        | 9.9     |
|                      | 2       | 109       | 11.5    |
|                      | 3       | 415       | 43.9    |
|                      | 4       | 288       | 30.5    |
|                      | 5       | 40        | 4.2     |
|                      | total   | 946       | 100.0   |

**Table 2: Renal failure according to age group**

| Age group | Renal failure | Percent | Total |
|-----------|---------------|---------|-------|
| ≤20       | 0             | 0.0     | 28    |
| 21-30     | 1             | 0.7     | 152   |
| 31-40     | 6             | 3.2     | 187   |
| 41-50     | 4             | 1.8     | 219   |
| 51-60     | 8             | 4.3     | 185   |
| 61-70     | 9             | 8.2     | 109   |
| 71-80     | 4             | 7.6     | 53    |
| 81-90     | 2             | 15.4    | 13    |
| Total     | 34            | 3.6     | 946   |

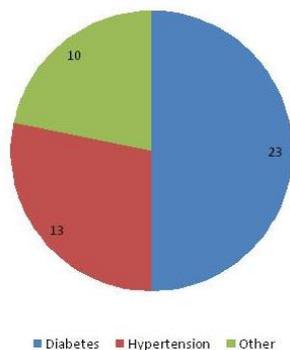
**Table 3: Relative effect of Age, Presence of diabetes, Hypertension or both on Chronic renal disease**

|                                | Adjusted Odds Ratio | Wald  | Sig.   | 95% C.I. for adjusted OR |       |
|--------------------------------|---------------------|-------|--------|--------------------------|-------|
|                                |                     |       |        | Lower                    | Upper |
| Age                            | 1.01                | 1.19  | 0.275  | 0.99                     | 1.04  |
| Diabetes                       | 5.97                | 9.01  | 0.003  | 1.86                     | 19.18 |
| Hypertension                   | 7.87                | 14.97 | <0.001 | 2.77                     | 22.38 |
| Both Diabetes and Hypertension | 22.27               | 34.45 | <0.001 | 7.90                     | 62.75 |
| Constant                       | 0.01                | 53.64 | <0.001 |                          |       |

Among the 34 case which were diagnosed to have chronic renal failure the association of diabetes and hypertension with renal failure was ascertained by cross tabulation analysis. Chi- square test results show that the association of hypertension (Chi square 43.6,  $p < 0.001$ ) and diabetes (34.6,  $p < 0.001$ ) is highly significant.

A logistic regression analysis was carried out with age, presence of hypertension and presence of diabetes as independent variables and chronic renal disease as dependant variable. The results are depicted in **Table 3** and show that the risk increases when both hypertension and diabetes are co-existing.

**Chart 1: Cause for chronic kidney disease as given by the treating hospital (N=46+)**



## Discussion

The study results show high burden of renal disease among the rural population in this part of Kerala with prevalence of 4.86%. There was no gender wise difference in the prevalence rates. It was found that diabetes was the most important risk factor for renal failure in our study. If the prevalence of earlier stages of disease which was beyond the scope of this study was also available the prevalence would have been more.

Few Indian studies available on prevalence of chronic renal failure used different methods and also give varying prevalence. A community based study conducted in south zone Delhi using serum creatinine for screening gives a prevalence of 0.79 which is far less compared to our study.<sup>(6)</sup> But the mean age in their study was 42 years much less than in our study. With higher proportion of elderly people in Kerala one can expect a higher prevalence attributable to this factor. Another hospital based screening study by Ajay Singh et al reports a prevalence of 17.2% but this figure cannot represent the actual prevalence in community as the screening was done among a selected population and hence the denominator is lacking.<sup>(7)</sup> An article in Indian journal of Nephrology compares the various prevalence estimates from India which varies from 0.785 to 17.8 but these studies used varying methods to estimate varying stages of CKD and the subjects studied varies in age and hence are not comparable.<sup>(8)</sup> Another study from rural Karnataka where glomerular filtration rate (GFR) was used for detecting CKD gives a prevalence of 6.3 for any stage of the disease among a population with mean age of 39.8.<sup>(9)</sup> A study among healthy government employees and family members with mean age of 35.6 using GFR to find out all stages reports a prevalence of 13-15%.<sup>(8)</sup> The National Kidney foundation estimates a global prevalence of 10%, ranks 27<sup>th</sup> in list of global causes of death and warns that in developing countries like India CKD is likely to increase disproportionately with increasing percentage of elderly people.<sup>(10)</sup> CKD is a serious health problem and can affect other systems in the body. A study conducted Viveh sinha et al found

that CKD is associated with thyroid dysfunction and dyslipidemia. Thyroid dysfunction was found in 38.6% patients and the most common being subclinical hypothyroidism.<sup>(11)</sup>

Studies in Kerala has shown high prevalence of uncontrolled hypertension and diabetes in the state and the prevalence of renal failure now obtained can be the result of the high prevalence of these risk factors. Though most of the hypertension and diabetes are diagnosed in Kerala and put on treatment control is not achieved in quite a large proportion of patients.

Vivekananda Jha et al identifies that the most common cause for CKD in developed and developing countries is diabetes and hypertension though regional problems may be major cause in some areas.<sup>(12)</sup> The meeting report of International society of nephrology analyses that in India the cause of CKD is mainly diabetes (31.2%) and hypertension cause for 12.8% and in 16.45 the cause remains undetermined.<sup>(13)</sup> The problem of managing end stage renal disease (ESRD) has been described by experts like Brig Narula, Consultant nephrologist, Armed corps Medical College Pune who describes that when the staggering cost of managing end stage renal disease is considered, we should focus on early detection and management of CKD along with its major risk factors diabetes and hypertension.<sup>(14)</sup> It is estimated that considering the cost only 10% of ESRD are likely to get Renal Replacement Therapy (RRT) in India and hence focus should be on early detection and treatment.<sup>(15,16)</sup>

The study from Gujarat observe poor glycemic control among patients having higher creatinine value. In our study diabetes is identified as the most important risk factor. So, awareness should be created among diabetic patients for glycemic control to prevent the occurrence of Diabetic Nephropathy.<sup>(17)</sup>

## Strengths and Limitations

The main strength of the study is that, it is community based. The study could detect only advanced stages of renal disease which are already diagnosed by tertiary care hospitals and was not designed for diagnosing earlier stages.

## Conclusions

The high burden of renal failure and its association with hypertension and diabetes points to the need for better treatment and control of hypertension and diabetes. This has to be considered along with the fact that even for the so called rural population in Kerala access to diagnostic and treatment facilities are available. It seems likely that treatment is only in the form of taking a tablet for diabetes or hypertension and forgetting about life style changes and self care and not bothering to check whether control is achieved and finally resulting in complications like renal failure. It also points to the need for more community based control programs for hypertension and diabetes and

along with that the detection of early stages of CKD and proper management to reduce end stage renal disease (ESRD).

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