

Early detection of renal disease among truck drivers through organized screening

Rama Ravi¹, Georgi Abraham¹, Rajalakshmi Ravi¹, Milly Mathews²,
Rajeevalochana Partasarathy²

¹Department of Public Health, Tamilnad Kidney Research Tanker Foundation, ²Department of Nephrology, Madras Medical Mission, Hospital, Chennai, Tamil Nadu, India

ABSTRACT

Background: Trucking industry is the backbone of trade and economy and in India, truck drivers are occupationally faced with various challenges. Several risk factors including stress and abnormal lifestyle predisposes this group to non-communicable disease and chronic kidney disease (CKD) is one of the major threats. This study was carried out to evaluate the prevalence and risk factors of chronic kidney disease. **Methods:** The present cross-sectional study was carried out as a population-based screening programme among 3,200 truck drivers in Tamil Nadu for a period of 1 year in 2018. A structured proforma was used to obtain information regarding the diabetic and hypertensive status. Body mass index was calculated and blood pressure was measured using standard equipments. Urine dipstick method was used to detect the presence of albumin and glucose in the urine. **Results:** The mean age of the participants was 40.3 years. Overweight and obesity was seen in 49.9% of the participants, while elevated blood pressure was observed in 41.1%. About 12.4% of the participants were known hypertensives on medications. Albuminuria was present in 19.7% of the participants. Albuminuria was significantly associated with elevated blood pressure, high body mass index and elevated random blood sugars ($P < 0.0001$). In 83.7% of the participants, random blood sugar was elevated beyond 200 mg/dl. **Conclusion:** The screening programme can be enhanced when coupled with an awareness campaign, with due focus on culturally relevant information delivered by trained health educators in the native language, so as to bring about adequate education through effective communication.

Keywords: Albuminuria, chronic kidney disease, diabetes mellitus, hypertension, obesity

Introduction

One of the major occupational sectors in India which contributes to a sizeable workforce from the lower economic groups is the logistics industry.^[1] Logistics industry, as an unorganized sector, provides minimal scope for self-sustained healthcare. Truck drivers often tend to neglect their health due to various economic reasons. In addition, their illiteracy and high-risk behaviors increase

their vulnerability to various health problems. The truck drivers essentially belong to socioeconomically disadvantaged section of the community, further complicating their health seeking pattern. As a result, primary healthcare serves as the first point of care for these truck drivers due to lack of affordability and accessibility. Among the several diseases to which this population is vulnerable, noncommunicable diseases (NCDs) are highly significant, owing to their irregular diet and lifestyle and widespread prevalence of substance abuse including smoking and alcoholism. A study done by Sharma PK in 2014 revealed that about 45.76% of the truck drivers are hypertensives and 30.1% have high risk body mass index.^[2]

In India, the prevalence of CKD as reported by International Society of Nephrology's Kidney Disease Data Center study was 17%.^[3] The

Address for correspondence: Dr. Rama Ravi,
Tamilnad Kidney Research Foundation, Chennai,
Tamil Nadu, India.
E-mail: ramangam@gmail.com

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key problems of CKD management faced in India include access to renal replacement therapy (RRT), and minimizing the risk of complications. The challenges in this regard, as evidenced from published literature stem from the fact that over 60% of the Indian population stop RRT due to financial reasons.^[4] Therefore, the need for early detection of risk factors and intervention regarding lifestyle modifications is substantially justified. Furthermore, the growing prevalence of other NCDs like type 2 diabetes mellitus, hypertension, and obesity increase the risk of CKD exponentially. Independent surveys have reported that over 40% of the type 2 diabetes mellitus patients develop CKD and one in five hypertensives develop CKD.^[5] It has however been established that poor awareness regarding CKD and its risk factors form the fulcrum of the problem. According to a study done by Hussain S *et al.*, 22.9% of Indians were not aware of the risk factors of CKD. The knowledge regarding CKD risk factors were significantly influenced by the socioeconomic status and therefore the need for creating awareness among the low income groups is highly pertinent.^[5]

In a country like India, strengthening primary health care is the most effective strategy for preventing NCDs including CKD. As a preliminary step, it is important to evaluate the morbidity pattern in the population, especially among vulnerable groups. In a country where majority of health care expenses are meted out as out-of-pocket expenditure, there is a need for devising early detection programs as a component of primary health care, that are feasible, reliable, and valid. The need for evaluating the morbidity pattern of CKD among truck drivers is justified by the limited access to renal replacement therapy or quality nephrology care and, increased burden on the primary health care in India.^[4] There are few published data to document the burden of CKD in this sector. There is therefore, an imminent need to focus on this vulnerable group so as to prevent the morbidity, mortality, disability and economic burden associated with the disease.

Objectives

This study was carried out among truck drivers to

- Estimate the prevalence of early kidney disease
- Evaluate the risk factors of kidney diseases
- Determine the association between early kidney disease and its risk factors.

Methodology

Study design and study setting

This cross-sectional study was carried out among all the truck drivers registered with large corporate oil company in Tamil Nadu for a period of 1 year between January and December 2018. A total of 3,200 truck drivers from 22 terminals and bottling plants were screened in the study period.

Ethical approvals and permissions

Approval was obtained from the Institutional Ethics Committee prior to the commencement of the study 18.1.2020. Written

approvals and permissions to carry out the study was obtained from the concerned authorities prior to the commencement of the study. Informed consent was obtained from the study participants prior to the data collection.

Study participant's profile

The study participants consisted of truck drivers who transport only petroleum and its products across various terminals and bottling plants in Tamil Nadu. These drivers travel throughout the day as per their work schedules and regulatory norms. They halt at various roadside sheds at nights and reach their homes only on completion of a specific schedule. Since they do not carry any other domestic loads, they are provided with personal protective equipment to prevent hazards from constant exposure to petroleum products. For most part of a month, they stay away from their families, for work reasons, thereby exposing themselves to various physical and psychosocial problems resulting in significant substance abuse.

Data collection

The data collection tool consisted of a structured interview schedule to obtain information regarding personal habits, history of drug intake for diabetes mellitus and hypertension. Knowledge regarding kidney diseases and their risk factors were also elicited. Height and weight were measured using standard scales and body mass index was calculated. Blood pressure was examined using electronic sphygmomanometer. Urine dipstick method was used for assessing albuminuria and glucosuria. Random blood glucose was estimated 2 h after the participant's last meal using standardized glucometer. The body mass index was categorized into obesity, overweight, normal, or underweight based on WHO classification of body mass index for Asians.^[6] A blood pressure >130/90 mmHg was considered as hypertension.^[7] Presence of Albuminuria ≥ 30 mg was considered as abnormal kidney function. Random blood glucose (postprandial -2 h) >200 mg/dl was considered as type 2 diabetes mellitus.^[8]

Data analysis

Data was entered and analyzed using SPSS ver. 15 software. The prevalence of early kidney disease and its risk factors were expressed as percentages. The association between risk factors and abnormal kidney function was analyzed using chi square test. A *P* value < 0.05 was considered statistically significant.

Results

This study was based on the findings of screening carried out among 3,200 truck drivers. Majority of the participants belonged to the age group of 35–60 years (61%) [Figure 1]. The mean age of the population was 40.3 ± 11.4 years. The mean body mass index was 25.1 ± 4.1 kg/m² [Table 1].

Majority of the study participants were unaware of kidney disease (78.3%) and almost all the participants were unaware of the risk factors of kidney disease (100%). Among the various

risk factors for kidney disease, overweight and obesity was seen in 49.9% of the participants, while elevated blood pressure was observed in 41.1%. About 12.4% of the participants were known hypertensives on medications. In 83.7% of the participants, random blood sugar was elevated beyond 200 mg/dl [Table 2].

In this study, albuminuria ≥ 30 mg was observed in 19.7% of the participants, while glucosuria was present in 18.2% [Table 3]. Known history of diabetes mellitus and hypertension, presence of overweight and obesity and elevated random blood sugar levels were significant risk factors for albuminuria ($P < 0.0001$) [Table 4].

Age was independently evaluated for albuminuria risk. It was observed that the mean age of the participants with albuminuria was 42.6 years, while the mean age of participants without albuminuria was 39.8 years. The difference in the mean values was statistically significant ($P < 0.0001$) [Table 5].

Discussion

The study population in the present study comprised of truck drivers who exclusively transport petroleum and its products across various terminals situated in Tamil Nadu. The work profile of these truck drivers consists of hectic schedules of transporting and delivery of the petroleum products from terminals to bottling plants to distribution depots. Throughout their working hours, these participants are acutely predisposed to elevated stress levels due to lack of sleep, staying away from family and pressure to complete timelines. Media reports reveal that 53% of the truck drivers suffer from some health issues, of which 23% battle for sleep, and 12% face mental stress.^[9] Elevated stress levels and lack

of sleep are significant risk factors for several non-communicable diseases, of which chronic kidney disease (CKD) is of utmost importance. A study done by Kim CW *et al.* has documented the linkages between abnormal sleep patterns and risk of glomerular hyperfiltration and CKD.^[10]

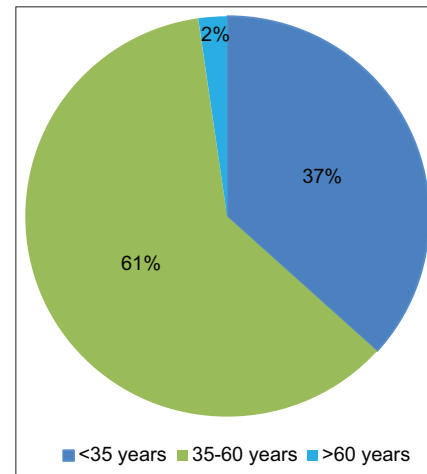


Figure 1: Age distribution of the study participants

Table 3: Abnormal parameters of renal function

Parameters	Frequency (n=3200)	Percentage (%)
Urine Albumin		
≥ 30 mg	631	19.7
Absent	2569	80.3
Urine glucose		
Present (>1+)	584	18.2
Absent	2616	81.8

Table 1: Mean values of various parameters

Parameter	Mean	Standard Deviation
Age (years)	40.3	11.3
Body mass index (kg/m ²)	25.1	4.1
Random blood glucose (mg/dl)	127	60.3

Table 2: Risk factors of kidney disease

Factors	Frequency (n=3200)	Percentage (%)
Body mass index (BMI)		
Overweight and obese	1596	49.9
Normal and underweight	1604	50.1
Blood pressure		
Elevated (>130/90 mmHg)	1315	41.1
Normal	1885	58.9
Known history of diabetes mellitus		
Present	508	15.9
Absent	2692	84.1
Known history of hypertension		
Present	398	12.4
Absent	2802	87.6
Random blood glucose		
Elevated (>200 mg/dl)	2677	83.7
Normal	523	16.3

Table 4: Significant risk factors for Albuminuria

Factor	n	Albuminuria		Chi sq	p
		Present	Absent		
Known history of diabetes mellitus					
Present	508	280 (55.1)	228 (44.9)	478	0.0001*
Absent	2692	351 (13.0)	2341 (87)		
Known history of hypertension					
Present	398	239 (60.1)	159 (39.9)	467	0.0001*
Absent	2802	392 (14.0)	2410 (86.0)		
Age (in years)					
<35	1175	177 (15.1)	998 (84.9)	26.4	0.0001*
35-60	1951	434 (22.2)	1517 (77.8)		
>60	74	20 (27.0)	54 (73.0)		
Body mass index					
Overweight and Obese	1596	411 (25.8)	1185 (74.2)	73.2	0.0001*
Normal	1604	220 (13.7)	1384 (86.3)		
Random blood sugar					
Elevated	2677	545 (20.4)	2132 (79.6)	4.2	0.04*
Normal	523	86 (16.4)	437 (83.6)		
Blood pressure					
Elevated	1315	376 (28.6)	939 (71.4)	111.1	0.0001*
Normal	1885	255 (13.5)	1630 (86.5)		

*statistically significant

Table 5: Relationship between age and Albuminuria

Category	(%)	Mean age (in years)	Mean difference	t	p
Albuminuria ≥ 30 mg		42.5	2.6	5.3	0.0001*
30 mg	16.4				
100 mg	5.1				
300 mg	2.2				
2000 mg	0.4				
Albuminuria < 30 mg		39.8			
< 10 mg	51.1				
10-20 mg	24.8				

*statistically significant

In the present study, the mean age of the participants was 40.3 years. Although only 12.4% of the participants were known hypertensives, 41.1% of them had elevated blood pressure, which was newly detected. Similarly, 15.9% of the participants were known to have type 2 diabetes mellitus, however, in 83.7% of the population screened, random blood sugars were above 200 mg/dl, indicating the extent of lack of awareness. The findings were similar to the studies done by Ramachandran A *et al.*^[11] The prevalence of albuminuria in the present study was 19.7%. In a study done by Jhawar M *et al.* in 2015 among the adult population with a mean age of 38 years, the prevalence of albuminuria was 9.3%.^[12] Similar findings were observed in studies done by Gallieni M *et al.*, Tatapudi RR *et al.*, and Anupama YJ *et al.*^[13-15] The present study observed higher prevalence of albuminuria compared to the published literature, which could be attributed to the inherent risk factors present among the truck drivers. The present study documented a statistically significant relationship with respect to age, body mass index, random blood sugar, and blood pressure against albuminuria ($P < 0.001$). Studies done by Jhawar M *et al.* and Anyabolu EN *et al.* have documented similar risk relationships with albuminuria.^[12,16]

The essential strategy for population-based screening of early kidney disease is based on the KEEP guidelines which involves extensive evaluation of renal function, in addition to evaluation of the risk factors through laboratory parameters. However, at the primary care level, it is essential for the screening programmes to focus on creating awareness and sensitizing the population to NCDs and indicators of abnormal kidney function. The screening modality employed in the present study is cost effective, simple, and feasible technique which can be applied at both individual and population level with improved compliance and validity. Studies have extensively evaluated the validity of the urine dipstick method for detecting albuminuria, and is found to be highly sensitive (>90%) when applied in large adult population.^[17]

The present study has revealed that majority of the participants lack adequate knowledge regarding kidney disease. Few studies have elicited the knowledge level regarding kidney disease, especially in this population. Considering the fact that CKD is a consequence of lifestyle diseases, the need for creating awareness regarding the same is inevitable. In a highly vulnerable population as truck drivers, it is essential for the parent organization/company

to take up large scale measures to create adequate awareness for their truck drivers through community participation by making best use of locally available infrastructure.

In India, logistics industry is the cornerstone for trade and economy with truck drivers forming the fulcrum of this industry. Since majority of the truck drivers belonging to the lower socioeconomic groups, primary care is the most effective means of addressing the health of these truck drivers. The present study has effectively highlighted the feasibility and validity of carrying out simple investigations for early detection of kidney diseases, which can be well implemented at the primary care level. As a preventive renal care package focused on truck drivers, the present study has successfully formulated a low-cost strategy for not only early detection, but also for imparting health education on lifestyle modification for various NCDs including obesity, type 2 diabetes mellitus and hypertension.

The burden of CKD and its risk factors is huge and challenging in emerging economies like India. The present study has only highlighted the tip of the iceberg. Covering a population of only 3,200 truck drivers, the study sample covered in this study is less than 5% of the total truck drivers in India.^[18] The potential target population for such organized screening activities is voluminous and a periodic screening once in 2 years for this population will not only help preventing CKD incidence through early detection, but also minimize health care costs and out-of-pocket expenditure for health-related spending in this unorganized sector, thereby having a sustained impact on the health economy and GDP. Moreover, these strategies are integral part of primary care and therefore, implementation of the screening strategy employed in this study will significantly optimize health care utilization and in the long run, empower the primary health care system to combat future challenges due to CKD.

Conclusion

The present study has significantly highlighted the need for sensitizing the truck drivers regarding kidney disease, especially beyond 40 years. Moreover, the study has emphasized the need for creating awareness regarding the risk factors of kidney disease, predominantly hypertension, obesity, and diabetes mellitus. Although various screening modalities are available, the present study has substantiated the feasibility, validity and cost effectiveness in carrying out a mass screening of the adult population, with due focus on vulnerable groups. The screening programme, as a primary care initiative, can be enhanced by complimenting with an awareness campaign, with due focus on culturally relevant information delivered by trained health educators in the native language, so as to bring about adequate education through effective communication.

Strengths

The present study has been carried out as a cost-effective model for early detection of various NCD and risk factors of CKD. Although this study has been limited to the truck drivers of

a specific industry and to a specific geographical area, there is adequate scope for replicating this model across various occupational sectors and in the same sector all over India.

Limitations

The present study was limited to basic investigations for detection of various NCD risks. Considering the costs and feasibility issues involved, investigations like fasting blood glucose, serum creatinine estimation and other investigations were not carried out.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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