EPIDEMIOLOGY AND DISTRIBUTION OF KIDNEY DISEASES AND ITS ASSOCIATION TO SOCIO-DEMOGRAPHIC FACTORS IN PATIENTS PRESENTING TO KHYBER TEACHING HOSPITAL, PESHAWAR

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ABSTRACT

Objective: This case control study was conducted to determine the epidemiology, demographic factors and common risk factors that were responsible for development of and estimation of fatal outcomes of kidney diseases and to create awareness at mass level.

Materials and Methods: It was an observational case control study including 480 subjects. Data was collected from all age groups of patients with a diagnosed kidney related illness as cases. An equal number of other participants having no kidney disease were taken as controls. Data was collected through the non-probability convenient sampling technique at multiple wards of Khyber Teaching Hospital, Peshawar between December 2016 and November 2019.

Results: A total of 480 individuals were studied. Out of which 240 were cases and 240 were controls. 318 out of the 480(66.2%) were males and 162(33.8%) were females. 120(25%) individuals presented with history of allergies, 111(23.1%) showed positive family history of kidney diseases, 246(51.2%) were smokers and 255(53.1%) gave positive history of drug-use for more than 1 month. 12(2.5%) individuals showed history of bee sting within a month.

Conclusion: Although our study failed to derive association between any of the socio-demographic factors and development of kidney related diseases. However, allergic conditions, respiratory tract infections, smoking, alcohol consumption and excessive use of drugs were observed to be more common in the cases. We conclude that further extensive studies are required to be done on this topic in different hospitals.

Keywords: Kidney disease, Socio-demographic, Acute Kidney Injury, Chronic Renal Failure.

INTRODUCTION

Kidney diseases can lead to a significant decrease in quality of life[1]. They can be classified into nephritic and nephrotic. Kidney diseases, any disturbance in the kidney glomerular channels prompts proteinuria, oedema and in steroid-resistant nephrotic disorder causing chronic renal failure. Affected kidneys demonstrate a diffuse mesangial sclerosis (DMS). The cardinal features are oedema, massive proteinuria and hypo-albuminemia [2]. The hyalinization of glomeruli permits molecules like albumin, immune-globulins and anti-thrombin to be excreted into the urine. Abnormalities from kidney diseases lead to elevated levels of triglycerides, cholestrol and apolipoprotein B containing lipoproteins VLDL and LDL. In response to these changes the liver initiates changes in metabolism, for example union of proteins, alpha-2 macroglobulin and lipoprotein.[3]

Signs of kidney diseases include oedema manifesting as periorbital oedema, pitting oedema of legs, pleural effusion, ascites and anasarca. Other signs include anaemia, dyspnoea and increased sedimentation rate due to increased fibrinogen. Some of the histological types of kidney diseases are focal segmental glomerulosclerosis, minimal change disease, rapidly progressive glomerulonephritis, membrano-proliferative glomerulonephritis and membranous glomerulonephritis affecting people of different demography. Kidney diseases can also occur secondary to other diseases like diabetic nephropathy, systemic lupus erythromatosis, sarcoidosis, syphilis, hepatitis B, sjogren syndrome, HIV, amyloidosis, multiple myeloma, vasculitis, cancer and drugs like penicillin and captopril [1-3].

The yearly rate of nephrotic disorder per 100,000 population in each of the following categories is such that 2 to 7 new cases occur in kids, 16 new cases

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occur in youngsters and 3 new cases occur in adults[4]. The commonest chronic glomerular disease in paediatric population is Idiopathic (Idiopathic Nephrotic Syndrome) and in West it occurs at the rate of 2 out of 100,000 children[5]. Even though nephrotic syndrome is found in patients of every age, it is found in significantly large prevalence in adults such that it occurs 26 times of as much as it occurs in children. The different types of nephrotic syndrome can be broadly classified according to age. The once which are common in children are minimal change disease, focal segmental glomerulosclerosis and membrano-proliferative gomerulonephritis while those common in the eldery are focal segmental gomerulonephritis and membrano-proliferative gomerulonephritis. Its most common secondary cause is diabetic nephropathy mostly occuring in adult. As far as genders are concerned nephrotic syndrome occurs two times as much in men as it occurs in women.

Prognosis of the kidney diseases under treatment is good despite of the fact that it depends on many factors such as treatment response, age of the patient and cause or type of the disease. Minimal change disease is the most common nephrotic syndrome in children, it occurs in 80% of children who have nephrotic syndrome and it responds very well to steroids therapy. It has also been termed as steroid sensitive nephrotic syndrome[6]. The another type of nephrotic syndrome is steroids resistant nephrotic syndrome which is defined as proteinuria after 2 months of treatment with oral prednisolone[7]. Without treatment, kidney disease has a terrible prognosis particularly rapidly progressing glomerulonephritis, which prompts acute renal failure following a couple of month.

Many socio-demographic determinants are found to be contributing towards outcomes of renal diseases, as supported by the literature. According to studies that relates race and socio demographic status, assessed rate of nephrotic kidney disease is between 2- 7 for every 100,000 kids around the world, with higher prevalence in kids of South Asian and African descents[8]. Chronic illness in a child has adverse effects on others in the family as well [9]. Studies have been conducted in order to find out the relation between behavioural and socio-demographic factors and kidney diseases. After adjusting for common socio-demographic determinants the relation between nephrotic syndrome and psychiatric diseases has been found in paediatric population. Some of the common psychiatry diseases which were found in nephrotic disease patients were conduct disorder, obsessive compulsive neurosis, hyperkinesis and emotional disorders. Hyperkinesis was the most common. In children with kidney disease the prevalence was 68% while in the control group it was 21.6%[10].

Derangement in renal function leads to hypertension and intravascular volume expansion because of increase in renal tubular reabsorption. It leads to oedema. Excessive weight gain, and metabolic abnormalities related to it, contributes to chronic kidney disease [11].

METHODS

It was an observational case control study in which we collected data from diagnosed patients of kidney diseases of all age groups as cases as well as equal number of other participants having no kidney disease as controls at Khyber Teaching Hospital. The duration of study was from December 2016 to November 2019. We collected our data by non-probability convenient sampling. Patients of all age and sex groups were included. Patients who were critically ill, mentally disabled and with no kidney disease were excluded. The sample size was 480 (240 cases and 240 controls). Data analysis was done with SPSS version 21.0 to calculate frequencies, percentage, means and standard deviations for the variables given in the questionnaire.

RESULTS

The cases and controls were matched for gender and age. Descriptive analysis for every variable studied was performed. Our study included 318 males (66%) and 162(34%) females. Mean age of patients with the disease was 43.15(standard deviation of 20.168) and control was 39.19(standard deviation of 19.61). The mean age of both the cases and control was 41.5(standards deviation of 19.89). Education of the subjects was such that uneducated were 267(55.6%), those with primary education were 75 (15.6%), those with matric education were 99 (20.6%) and those with higher education were 39(8.1%).

Table 1 demonstrates consumption of water from different sources among the patients. The highest being used from non -conventional sources labelled as 'other' in the table. The 'other' category consisted of sources like stream water.

Furthermore, 117 cases and 63 controls had pre-existing diseases. While 123 cases and 177 controls did not had any pre-existing illness. The odd ratio turns out to be 1.27(CI 95% 0.63-2.5) which means that individual having pre-existing-illness (diabetes, hypertension and pneumonia etc) were 1.27 times more prone to the kidney diseases. There were 63 cases and 81 controls having history of respiratory tract infection. Whereas 177 cases and 159 controls did not had any history of respiratory tract infection (RTI). The odd ratio was 0.699(CI95% 0.35-1.38). Therefore our data showed negative association of RTI with the kidney diseases, which was significant. 93 cases and 153 controls had history of active or passive smoking while 147 cases and 87 controls do not have any history of smoking. The odds ratio was 0.36(CI95% 0.190-0.683) and it showed that smokers were 0.36 times less prone to the kidney diseases and showed negative relation with the smoking.

Table 1: Drinking Water Source

Source	Frequency	Percent
Municipal water	48	10.0
Well water	105	21.9
Boring	135	28.1
Others	192	40.0
Total	480	100.0

Table 2: History of any drug use for one month or more

Drug Use	Group		Total
	Case	Control	
Yes	132	123	255
NO	108	117	225
Total	240	240	480
Odds ratio	1.163		

Table 3: Family History of Renal Disorders

Family history	Group		Total
	Case	Control	
Yes	63	78	141
NO	177	162	339
Total	240	240	480
Odds ratio	1.42		

Regarding the recent use of drugs (Table 2), there were 132 cases and 123 controls having history drug use within a month. 108 cases and 117 controls did not have any history of recent use of medication. The odds ratio was 1.163(CI 95% 0.65-1.24) which shows positive association between recent drug use and kidney disease

Moreover, 63 cases and 78 controls had family history of kidney diseases (Table 3). The odds ratio was 1.42(95%CI of 0.67-2.95) which meant that individuals having family history of kidney diseases were 1.42 times more prone to the kidney diseases which was significant. Lastly, 60 cases and 60 controls had presence of allergy. The odds ratio came out to be 1 and showed no association to the presence of allergy to the kidney diseases.

DISCUSSION

Many studies have been done to find out relationship between socio-demographic factors and kidney diseases, however, kidney diseases still prevail in our country. According to Pakistan Medical Association, kidney diseases accounts for 20,000 deaths annually out of the 20 million people who suffer from kidney diseases in our country thus giving it a rank of 8th in mortality. Renal stones, low water intake, medications, unhealthy food intake, hypertension and diabetes are some of the common causes of kidney diseases. To find out the relation of kidney diseases with socio-demographic factors, we conducted this study in Khyber teaching Hospital. In our study, sample was chosen 480 out of which, 240 were cases and 240 were control from different wards of Khyber teaching hospital.

Different kidney diseases are caused by medications taken for kidney infections as a wide range of medications are used for treating pyelonephritis. Medications induced Acute Renal Failure (ARF) represented 20% of all ARF in an Indian Study of which aminoglycosides were responsible for 40% of total cases[12]. Our data supports these results, despite the fact that we have not mentioned a particular medication but rather included medication history of all the drugs taken by the patients over the last month. The odds ratio is 1.16(CI, 0.61-2.16), while study in other journals shows odds ratio of 2.1(95%CI 1.1-3.7) which support the results of our studies[13].

A group of students carried out a study in 2005 on a small scale to discover a relationship between kidney diseases occurrence in patients having positive family history. They discovered positive relation particularly in patients who have experienced kidney biopsies[14]. Our results demonstrates that there is no relationship between positive family history and kidney disease.

Pre-existing debilitating diseases is also important in the development of kidney diseases. A study done in 2010 confirms this association[15]. But the results of our study are opposite to this which does not support this association. The reason of this difference may be attributed to poor data collection techniques or research biases.

Describing the association of bee sting with the kidney diseases, our data shows no relation between them. The odds ratio comes out to be 0.95 with the confidence interval of 0.903-2.538. This data is contradictory to the other studies which show association of bee sting to the kidney diseases. One of which is mentioned here, the history of man with multiple bites of honey bee, developed anaphylactic shock and ended up with acute renal failure[16].

Another one of the causes of kidney diseases is smoking. A study conducted in 1978 showed association between kidney disease and smoking tobacco. The association of smoking and kidney diseases like nephrotic syndrome has also been shown by studies related to American Association of Kidney Patients (AAKP) [17]. Some evidence of dose-response trend was also found in another study. That study showed that CKD has positive association with smoking and inverse relation was found between CKD and smoking such that chronic kidney disease prevalence was decreased

with time since which smoking was quit. Many different smoking related mechanisms have been found which cause kidney injury. These mechanisms include the effects of smoking on endothelial function, in acceleration of renal atherosclerosis and changes in systemic and renal hemodynamics. [18] Our data is in contrast to the above one, the odds ratio is 0.36 and shows negative association with the disease under consideration. This may be because of different demographic factors or study differences.

Another study which had different results from our study was conducted in rural India showed the significance of bee sting with the Acute renal failure. Nine cases were selected in the study, six out of them had acute kidney injury. Bee venom contains toxic substances like mellitin, phospholipases, apamine, mastocytolytic peptide, hyaluronidase, histamine, dopamine and minimine. These substances are hemolytic, neurotoxin, histamine releaser, vascular permeability increaser, hemodynamic toxin and cell membrane toxin. Among these most lethal, pain inducing and highest in quantity is mellitin.[19]

CONCLUSION

Although our study fails to show these factors as causes of kidney diseases but it finds association between them. The literature shows that allergic conditions, respiratory tract infections, smoking, alcohol consumption, animal toxins i.e bee sting, scorpion toxins and snake venom, excessive use of medications are known causes of kidney diseases. So by avoiding the above mentioned factors which are modifiable, we can prevent the kidney diseases and can decrease the number of mortalities and morbidities associated. Further studies on this topic are required.

REFERENCES

1. Electronic Learning Module for Kidney and Urinary Tract Diseases". Archived from the original on 2008-12-20. Retrieved 2015-12-25
2. The primary nephrotic syndrome in children. Identification of patients with minimal change nephrotic syndrome from initial response to prednisone. A report of the International Study of Kidney Disease in Children. J Pediatr 98:561–564
3. DURAN ALVAREZ, Sandalio. Acute complications of nephrotic syndrome Cuban Journal of paediatric [online]. 1999, vol.71, n.4, pp. 245-253. ISSN 1561-3119.
4. Agrawal S, Zaritsky JJ, Fornoni A, Smoyer WE. Dyslipidaemia in nephrotic syndrome: mechanisms and treatment. Nature reviews Nephrology. 2018;14(1):57-70. doi:10.1038/nrneph.2017.155.
5. International Study of Kidney Disease in Children Nephrotic syndrome in children: prediction of histopathology from clinical and laboratory characteristics at time of diagnosis. A report of the International Study of Kidney Disease in Children. Kidney Int. 1978;13:159–165. doi: 10.1038/ki.1978.23
6. International Study of Kidney Disease in Children The primary nephrotic syndrome in children. Identification of patients with minimal change nephrotic syndrome from initial response to prednisone. J Pediatr. 1981;98:561–564. doi: 10.1016/S0022-3476(81)80760-3
7. Schulman SL, Kaiser BA, Polinsky MS, et al. Predicting the response to cytotoxic therapy for childhood nephrotic syndrome: superiority of response to corticosteroid therapy over histopathologic patterns. J Pediatr. 1988;113:996–1001. doi: 10.1016/S0022-3476(88)80570-5
8. Eddy AA, Symons JM: Nephrotic syndrome in childhood. Lancet 2003,362(9384):629–639.
9. Talbot NB, Howell MC: Social and behavioral causes andconsequences of disease among children, in Talbot ND,Kagan J, Eisenberg (eds): Behavioral Science in Pediatric Medicine. Philadelphia, WB Saunders, 1971, pp 36-39
10. Guha, Prathama, Arun De, and Malay Ghosal. "Behavior Profile of Children with Nephrotic Syndrome." Indian Journal of Psychiatry 51.2 (2009): 122–126. PMC. Web. 6 Mar. 2018
11. Hall JE, Crook ED, Jones DW, Wofford MR, Dubbert PM. Mechanisms of obesity-associated cardiovascular and renal disease. Am J Med Sci. 2002;324(3):127–137
12. Perneger TV, Whelton PK, Klag MJ. Risk of kidney failure associated with the use of acetaminophen, aspirin, and nonsteroidal antiinflammatory drugs. New England Journal of Medicine. 1994 Dec 22;331(25):1675
13. Lei HH, Perneger TV, Klag MJ, Whelton PK, Coresh J. Familial aggregation of renal disease in a population-based case-control study. Journal of the American Society of Nephrology. 1998 Jul 1;9(7):1270-6
14. Nash K, Hafeez A, Hou S. Hospital-acquired renal insufficiency. Am J Kidney Dis.2002;39:930–6
15. Kopp JB, Smith MW, Nelson GW, Johnson RC, Freedman BI, Bowden DW,et al.MYH9 is a major-effect risk gene for focal segmental glomerulosclerosis. Nat Genet. 2008;40(10):1175–1184.
16. Lin HC, Chen HH, Yeh JC. Acute renal failure complicated by multiple bee stings: a case report and literature review. Acta Nephrologica. 2001 Jan 1;15(1):20-2
17. Szromba C. Smoking in chronic kidney disease. Nephrology Nursing Journal. 2003 Oct 1;30(5):578
18. Shankar A, Klein R, Klein BE. The association among smoking, heavy drinking, and chronic kidney disease. American journal of epidemiology. 2006 Jun 14;164(3):263-71
19. Deshpande PR, Farooq AK, Bairy M, Prabhu RA. Acute renal failure and/or rhabdomyolysis due to multiple bee stings: a retrospective study. North American journal of medical sciences. 2013 Mar;5(3):235