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Cigarette Smoking: Risk Factor for Kidney Injury

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Abstract

There are various kinds of serious diseases caused by our poor lifestyle and unhealthy habits. Renal diseases are one of the major issues in the current scenario. The prevalence of diabetic and non-diabetic renal disease has increased, and smoking has become a significant modifiable risk factor for both the progression of acute kidney injury from micro-albuminuria and proteinuria, elevated blood creatinine, and ultimately, renal failure in both acute and chronic renal diseases. Endothelial cell dysfunction was also observed in many research studies, especially in smokers. Renal hemodynamic are abnormal and cause harm to the kidney by cigarette smoking, which has been shown to play a significant role in both short-term and long-term research. In a retrospective case-control analysis, smokers were reported to be at increased risk of progression to end-stage renal disease (ESRD) with immunological (glomerulonephritis) and non-immune autosomal dominant polycystic kidney disease (ADPKD) renal disorders. Smokers are at risk not only for kidney disease, but also for lung and heart disease. Smokers are more prone to many diseases. So advising them to quit smoking can reduce their chance of kidney issues as well as renal injury.

Keywords: Acute Kidney Injury; Cigarette Smoking; Glomerulonephritis; Diabetic Nephropathy

Abbreviations: ESRD: End-Stage Renal Disease; ADPKD: Autosomal Dominant Polycystic Kidney Disease; AVP: Arginine Vasopressin; ACTH: Adrenocorticotropic Hormone.

Introduction

Cigarette smoking is one of the most common toxic lifestyle habits. People have smoked tobacco in various forms depending on their social status since ancient times. Cigarettes are tobacco-filled smoking devices made of other combustible materials and wrapped in thin paper. Day by day, the number of cigarette smokers has increased worldwide, which will lead to an increase in many kinds of diseases such as heart disease, lung disease, high blood pressure, and renal diseases. There are already many reports focusing on heart and lung diseases associated with cigarette smoking. The chain smokers are affected more because they are used to smoking several cigarettes in succession. They not only cause harm to themselves but also cause harm to passive smokers. Tobacco consumption, whether in the form of chewing or smoking, is harmful. Among other serious kinds of health-related threats. Renal diseases—different kinds of renal injury—are one of them. Cigarette smoking is also known as a major risk factor for different kidney-related problems, including kidney injury. It was reported by the WHO that tobacco can kill approximately 6 million people annually worldwide, which is expected to increase to more than 8 million annually by 2030 [1,2]. Although the renal risk provided by smoking has been known to dialectologists for over two decades, it has only lately garnered attention even among nephrologists. This is in stark contrast to the well-documented possibility of causing carcinogenesis, lung illness, and cardiovascular events [3-5]. China is the major producer of cigarettes. Over one billion people, or 20% of

the population of the earth in 2014, were regular cigarette smokers. About 80% of smokers worldwide were men. According to the WHO, there are 1.3 billion tobacco users observed in low- and middle-income countries. In contrast to the declining or stable rates seen in developed countries, increased smoking is observed in developing countries, particularly among men.

In Southeast Asian countries and some places in Europe, such as the Balkan region, the largest numbers of cigarette smokers are observed. Smokers are more common in densely populated areas. There were reports discussed about the socioeconomic association between cigarette smokers and diseases. Cigarette smokers with HIV, TB, diabetes, hypertension, asthma, hepatitis, anemia, and other co-morbid conditions suffer a lot due to the toxic effects of cigarettes. Because of increased health and social awareness, early education about the harmful effects of tobacco and cigarette consumption is now beneficial in lowering the status of smokers. Tobacco use has declined dramatically since the 1950s, and future projections indicate an even steeper decline [6,7].

Kidney Damage Caused by Cigarette Smoking

Kidneys are the basic organ for blood filtration and reabsorption along with them also help in urine excretion [8]. Long-term cigarette smoking can lead to a variety of diseases, including kidney damage. Kidney issues are observed more in smokers with hypertension, diabetes, and other chronic diseases. One of the previous reports suggests a temporary rise in blood pressure and heart rate associated with cigarette smoking [9]. The main disadvantage of this habit is that your blood pressure will remain elevated even if you stop. It was also reported that a regular smoker and a non-smoker both had an increase in blood pressure when comparing a day of smoking to a day of not smoking Previously, it was believed that smokers did not have a higher risk of hypertension than non-smokers [3], but this was due to the fact that hypertension is less noticeable in an underweight person than an overweight person. The majority of smokers are believed to be underweight. According to Cryer, et al. [10], when a smoker smokes a cigarette that causes sympathetic activation, which tends to enhance the activity of some hormones by releasing them, such as aldosterone, arginine vasopressin (AVP), adrenocorticotropic hormonere and heart rate associated with cigarette smoking [9]. The major drawback of this habit is that even if you quit it, your blood pressure will remain elevated. It was also reported that an increase in blood pressure was noticed when comparing a day of smoking to a day of not smoking in the case of a regular smoker and a non-smoker. Previously, it was believed that smokers did not have a higher risk of hypertension than non-smokers [3], but this was due to the fact that hypertension is less noticeable in an underweight person than an overweight person. The majority of smokers are believed to be underweight. According to Cryer, et al. [10], when a smoker smokes cigarettes, that causes sympathetic activation, which tends to enhance the activity of some hormones by releasing them, such as aldosterone, arginine vasopressin (AVP), adrenocorticotropic hormone (ACTH), and cortisone. These are also known as hormones that can activate blood pressure [10]. It was also reported that smoking can cause hypertension and arterial stiffness. All these effects work together in the filtration mechanism of the kidneys. So smoking causes trouble in renal hemodynamic, which will lead to a decrease in glomerular filtration rate by causing a rise in blood pressure, vascular resistance, and heart rate.

A comparison study of cigarette smokers and healthy people discovered that the presence of nicotine in cigarettes is the primary cause of renal hypertension and decreased GFR. The prolonged use of cigarettes or smoking cigarettes can cause damage to the renal vasculature, proteinuria, substantial interstitial fibrosis, and glomerulosclerosis. As per Gambaro, et al. [11] and Lhota, et al. [12] it was observed that in the case of cigarette smokers, endothelin-1 concentrations are elevated, which is associated with enhanced renovascular resistance and will lead to primary renal and vascular issues, which in turn will lead to illness in the kidneys. It was reported that cigarette smokers also suffered from myointimal hyperplasia and arteriolar hyalinosis [11-13]. But in the case of IgA nephropathy, cigarette smoking had no association [3,14-16]. It was observed that the interaction of oral mucosa with acetone extract from cigarettes leads to several kidney-related issues in rats. As per Halimi, et al. an increased level of cGMP excretion in urine was observed in the case of cigarette smokers [13,14].

Diabetic nephropathy was found to be more prevalent in cigarette smokers than in non-smokers. In diabetic cigarette smokers with elevated serum creatinine and proteinuria, microalbuminuria was observed Christiansen, et al [5]. Loss of GFR rate is also observed, especially in elderly males [17,18]. It was also reported that there are some genetic mutations observed in cigarette smokers that can cause renal cysts in autosomal dominant polycystic kidney disease (ADPKD). End-stage renal disease (ESRD) and other renal diseases, such as inflammatory and non-inflammatory renal issues, are common in cigarette smokers [19]. Patients without ACE inhibitors were at risk, but those patients with ACE inhibitors were also not fully protected. It may help to achieve the required blood pressure, but it was observed that serum creatinine levels were elevated. Hypertensive cigarette smokers have a higher prevalence of glomerular disease, nodular glomerulosclerosis, and renal illness.

However, large prospective studies investigating hard end-points, such as the time it takes for serum creatinine levels to double, are clearly indicated because of the lack of certainty in the definition of renal functional deterioration in the available studies. It's important to remember that smoking's negative effects on renal function add to the cardiovascular risk it already poses. The general population shows an increased prevalence of established cardiovascular risk factors and cardiovascular morbidity when urinary albumin concentrations rise below the microalbuminuria range. This is true even in people who do not have diabetes or hypertension. In severe condition of kidney issues or renal injury patients are treated with renal replacement therapy, artificial kidneys as one of the treatment alternatives [20-23]. But if smoking habit still persist then chance of organ damage will be more.

Smoking is not good for human health. A co-morbid patient should quit this practise to lead a healthy life. So, in many cases, quitting tobacco will have a significant impact on regaining good health, especially because it will reduce many negative effects.

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