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Effect of Tobacco Smoking Active and Passive on The Kidney Functions

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Effect of Tobacco Smoking Active and Passive on The Kidney Functions

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ABSTRACT

Background: Cigarette smoking was listed as one of the most important risk factors for incident chronic kidney disease (CKD). In the general adult population, cigarette smoking has been associated with elevated risk of incident CKD / end stage kidney disease (CKD). This correlation was independent of proven CKD risk factors including age, hypertension, DM and BMI.

Aim of work: To compare between tobacco smoking active and passive effect on the kidney functions in a cross section observational study.

Patient and Methods: One Hundred fifty (age and sex matched) patients will be enrolled in a cross section study. The study will be conducted in Nephrology Unit Al-Hussein University Hospital and Air Forces General Hospital.

Results: Comparative study between the 3 groups revealed. Spearman's correlation analysis shows that; SBP, DBP, HR and smoking index, had significant negative correlation with eGFR; with significant statistical difference (p < 0.01 respectively). By using ROC - curve analysis, Smoking index at a cutoff point (>291) predicted patients with CKD, with good (83%) accuracy, sensitivity= 73% and specificity= 100% (p < 0.01).

Conclusion: Our research has shown that smoking, especially heavy smoking (> 30 pack / year), is a significant risk factor for CKD development. For CKD, the correlation was graded as diabetic nephropathy and hypertension the strongest. This findings increase the importance of cessation of smoking in order to minimize the occurrence of CKD and other preventable diseases such as COPD, coronary artery diseases, and cancers.

Keywords: Chronic kidney disease; End stage renal disease; chronic vascular disease; Body mass index; Diabetes mellitus.

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INTRODUCTION

Cigarette smoking was listed as one of the most important risk factors for incident chronic kidney disease (CKD). In the general adult population, cigarette smoking has been associated with elevated risk of incident CKD / end stage renal disease (CKD). This correlation was independent of proven CKD risk factors including age, hypertension, DM and BMI.1 Cessation of smoking substantially reduced the risk of a CKD occurrence, while increased the risk of CKD for those who quit smoking lasts for several years. Furthermore; smoking is linked with albuminuria / proteinuria cases in the general adult population.2 Research in vivo have indicated which nicotine can stimulate the spread of mesangial cells and raise extracellular matrix production. Second, new studies has shown that cigarette smoke contains glycotoxins; that can quickly induce the formation of advanced glycation end products (AGEPs) in vivo and in vitro AGEPs has been shown to raise vascular permeability and encourage pathological vascular changes in renal disease.3 The drastic rise in CKD patients worldwide is encouraging nephrologists to adopt preventive strategies. Smoking appears as an significant modifiable kidney risk factor based on several studies documenting a strong correlation between smoking and kidney harm in general population individuals, some research documenting a beneficial impact of cessation of smoking on kidney renal outcome; Numerous reports recording smoking-related modifications that have been shown to be detrimental to the kidney (e.g. an increase in BP) and experimental evidence suggesting that cigarette smoke influences mediator mechanisms known to be involved in the genesis of progressive kidney damage, both invivo and invitro.4

Secondhand smoke exposure was linked to higher CKD prevalence as well as development of CKD incident, the prevalence of exposure to passive smoking between the non-smokers were surveyed and the correlation with CKD development in persons who have normal eGFR was investigated.4 The high exposure to tobacco among kidney patients (current, passive or past) may be associated with the growing global trend of end-stage renal disease and the gender gap found in that disease.5
PATIENT AND MATERIALS

One Hundred fifty (age and sex matched) patient will be enrolled in a cross section study. The study will be conducted in Nephrology Unit Al-Hussein University Hospital and Air Forces General Hospital.

The 150 patient are divided into 3 groups: Group (A): 50 patient heavy smoking. Group(b): 50 patient passive smoking. Group (c): 50 patient normal controls non-smoking.

Inclusion criteria: Patient agings thirty years or more. All patient smoking index (more than three hundred). Patient who exposed to passive smoking more than 5 years.

Exclusion criteria: Age < thirty years smoking. Patient who have malignant diseases. Patient with hepatic impairment, DM, HTN or hyperlipidemia. Obesity and x syndrome.

At enrollment, all patients will be subjected to the following: Full history taking from patients. Complete clinical examination. Basal laboratory work-up: (serum creatinine, Blood Urea, Bun, S. Na, S. K, S. Albumin, CBC, A/C ratio). Glomerular filtration rate (estimated).

This was a case control study conducted on one hundred patients with chronic kidney disease (CKD) and fifty healthy controls, to compare between tobacco smoking active and passive effect on the kidney functions in a cross section observational study.

![Fig 1: Correlation between eGFR and SBP.](image1)

![Fig 2: Correlation between eGFR and smoking index.](image2)

RESULTS

Comparative analysis revealed between the 3 groups; highly substantial increase in CKD incidence in heavy and passive smokers; relative to control group; with highly significant statistical difference (p < 0.01).

Regarding outcome data, (24.7%) of patients had CKD.

![Fig 3: ROC curve of smoking index (CKD).](image3)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (%)</th>
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<tbody>
<tr>
<td>CKD incidence</td>
<td>37 (24.7%)</td>
</tr>
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</table>

Table 1: Outcome data among 150 subjects: Regarding outcome data, (24.7%) of patients had CKD.

Comparative analysis revealed between the 3 groups; highly substantial increase in K and ACR in heavy smokers; relative to other groups; with highly substantial statistical difference (p < 0.01 respectively).

Comparative analysis revealed between the 3 groups; highly substantial decrease in eGFR in heavy smokers; relative to other groups; with highly substantial statistical difference (p < 0.01).

DISCUSSION

Regarding clinical data, we found that; the mean age of all patients was (43.87 ± 7.1) years. Regarding gender of the patients, the majority (80.7%) of patients were males; while (19.3%) were females, which came in agreement with 5,6,7,8 and 9.

Nogueira et al.9 reported that, there were 668 non-smokers and 329 smokers, of whom 233 were ex-smokers, and 96 were current smokers, with mean age 46.2 ± 13.9.

Gomboset al.2 recorded that while 102 patients (25%) continued to smoke (S group). 300 (75%) were non-Smokers (NS group). Patients in group S smoked 12.4 ± 12.4 pack-months (ppm); their CO was high in exhalation (9.1 ± 6.8 ppm).

Dülger et al.3 reported that, the topics covered in the study were categorized into 3 groups: Group I (active
albinumria, and subjects with hypertension were at elevated risk of albuminuria when subjected to secondhand smoke. There is, however, inconclusive evidence about second-hand smoke and CKD. No population-based studies have assessed the correlation between tobacco and renal function in children.

Comparative analysis revealed between the 3 groups; highly substantial increase in hemoglobin, platelets, creatinine, urea, BUN, urinary albumin, in heavy and passive smokers; compared to control group; with highly substantial statistical difference (p < 0.01 respectively), which came in agreement with 3, 4, 5, 6, 10,11.

Arain et al.11, reported that, Mean creatinine clearance of exposed kidney patients (EKPs) in urine samples was substantially reduced relative to referent-diseased patients (p<0.01) and collected in acid-washed, decontaminated polyethylene tubes as morning urine samples (spot test) (KartellI, Milan, Italy).

Comparative analysis revealed between the 3 groups; highly significant increase in K and ACR in heavy smokers; compared to other groups; with substantial statistical difference (p < 0.01 respectively), which came in agreement with 4,5,10,12.

Yacoub et al.4,reported that, urinary albumin is well known to be a reliable marker of glomerular injury, and the fact that smoking is linked to albuminuria indicates direct or indirect smoking-induced renal damage. Participants with critical hypertension noticed that in smokers, the rate of microalbuminuria was almost twice that in non-smokers. Many studies have found similar findings.

Obertet al.12,reported that, to decide whether mesangial cell expansion induced by ETS was correlated with alterations in urinary protein excretion, we tested albuminuria diabetic mice that had been exposed to air and ETS.In db/db diabetic mice, diabetic mice exposed to air had urine albumin excretions within the range reported by others 10; however, contrary to our Western blot analysis and morphometric analysis, exposure to ETS has not substantially altered albumin urinary excretion: control (1.03 ± 0.16 mg albumin/mg creatinine) versus ETS (1.04 ± 0.13 mg albumin/mg creatinine; Pvalue not significant).

Comparative analysis revealed between the 3 groups; highly significant decrease in eGFR in heavy smokers; relative to other groups; with highly substantial statistical difference (p < 0.01), which came in agreement with 4,10,and 12.

Yacouby et al.4,reported that, GFR was higher in smoking patients by a factor of 1.44 relative to insulin-dependent diabetes mellitus (IDDM) non-smoking patients and by a factor of 1.66 between NIDDM patient.

Comparative analysis revealed between the 3 groups; highly substantial increase in CKD incidence in heavy and passive smokers; relative to control group; with highly substantial statistical difference (p < 0.01), which came in agreement with 3 and 4.
Yacoubet et al.,^4 reported that chronic kidney disease (CKD) prevalent major health issue which has led to the need renal substitute treatment increasing. The causes and effects of cardiovascular risk factors such as diabetes, obesity and hypertension are related to CKD. Usage of smoking and phenacetine is further established and effects of cardiovascular risk factors such as smoking were found to be an independent risk factor for the faster development of CKD during nephritis. As urinary albumin is a reliable predictor of glomerular injury, it is possible that the association between smoking and albuminuria suggests direct or indirect renal damage caused by the smoking. It is responsible for worsening kidney function by growing the risk of microalbuminuria, increasing the development from microalbuminuria to proteinuria and resulting in diabetic nephropathy that contributes to renal disease (CKD) in the end stage.

Multiple regression analysis shows that; after applying (Forward method) and entering some predictor variables; the increase in BMI and the decrease in smoking index; had an independent effect on increasing eGFR; with significant statistical difference (p < 0.05 respectively), which came in agreement with.4

Yacoubet al.,^1 reported that, urinary albumin is well known to be a reliable marker of glomerular injury, and the fact that smoking is linked to albuminuria suggests direct or indirect smoking-induced renal damage. Participants with critical hypertension and noticed that the incidence of microalbuminuria in smokers was nearly double that in non-smokers.

Many studies have found similar findings.

By using ROC-curve analysis, Smoking index at a cutoff point (>291) predicted patients with CKD; with good massive effect on the kidney functions in a cross section observational study; which came in agreement with.33

CONCLUSION

Our research has shown that smoking, especially heavy smoking (> 30 pack / year), is a significant risk factor for CKD development. For CKD, the correlation was graded as hypertension and diabetic nephropathy the strongest. These findings increase the importance of cessation of smoking in order to minimize CKD and other preventable disorders such as coronary artery diseases; COPD; and cancers.

REFERENCES