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Review on Chronic Kidney Disease: Its Risk Factors and Treatment

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Abstract
Chronic kidney disease (CKD) is a life threatening condition characterized by progressive and irreversible loss of renal function. CKD is a precursor to end-stage renal disease, is associated with increased risk of morbidity and mortality. Over 10% of Indian population are suffering with CKD. Risk factors of CKD includes Age, Diabetes, Hypertension, smoking, Alcohol, Obesity. We can stop the progress of the disease by proper choice of Reno-protective combinations and should make patient to adhere to the medication for better outcomes.

Keywords: *Chronic kidney disease, Risk factors, ACE Inhibitors, ARB`s, Disease progression.*

Introduction

Kidney is the filtering sponge; it filters about 113 to 114 litres of blood to create 0.94 to 1.8 litres of urine every day[1]. Kidney functions as filters of the blood, it decides to retain the useful components like proteins and drains the waste material from the blood, in If it gets damaged then the proteins get leaked into urine, in later stages kidney slowly loses its ability to filter, if this condition exists for more than 3months then it is called as CKD.

Chronic kidney Disease is the worldwide health problem. It is more prevalent in elderly population of Age above 60years [2]. it is age related disease and triggered by hypertension[3], diabetes, Obesity and other renal disorders like high cholesterol, poly cystic kidney disease.10% of the Indian population suffers from chronic kidney diseases [4].

Classification of CKD[4.1]

Based on the rate of glomerular filtration, the CKD has 5 stages, they are

- Stage 1: GFR (>90 mL/min/1.73 m ^{2}).
- Stage 2: GFR (60-89 mL/min/1.73 m ^{2}).
- Stage 3a: GFR (45-59 mL/min/1.73 m ^{2}).
- Stage 3b: GFR (30-44 mL/min/1.73 m ^{2}).
- Stage 4: GFR (15-29 mL/min/1.73 m ^{2}).
- Stage 5: GFR <15 mL/min/1.73 m ^{2} or dialysis.

In stage 1 and 2 Chronic Kidney Disease, diagnosis may not be finalized only by reduced GFR. There are few more parameters which are the markers of kidney damage.

1) Albuminuria (albumin excretion >30 mg/24 hr or albumin: creatinine ratio >30 mg/g [>3 mg/m.mol]).
2) Urine sediment abnormalities.
3) Electrolyte and other abnormalities because of the tubular disorders.

4) Histologic abnormalities.
5) Detection of Structural abnormalities by imaging.
6) kidney transplantation history, in such cases.

Risk Factors

Obesity

Though people do not have history of hypertension or diabetes, a study states that they are at three-fold risk of developing CKD [5].

Smoking

- In a retrospective study,4142 participants of about 65yrs old with history of smoking. There creatinine level is raised about 0.3% than the normal. This study reveals smoking causes CKD[6].
- Smoking is the risk factor for urinary stone formation[7]it eventually leads to CKD[8].
- A 5yrs cross-sectional study on Heavy smokers(>30pack/year) revealed that Smoking is the factor for CKD [9]
- Smoking increase the mortality in dialysis patients although there was not a corresponding increased risk of Cardiovascular events [10].

Alcohol

Progress of CKD to ESRD is more due to consumption of alcohol [11]. Alcohol consumption of more than two alcoholic drinks per day, on average, was associated with an increased risk of kidney failure in the general population [12].

Diabetes Mellitus

In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by china and US [13]. Recent 2015 data of WHO India states that about 69.2 million people are living with diabetes (8.7%) in India [14].

Mechanisms that lead to kidney disease in diabetes include hyper filtration injury, advanced glycosylation end products, and reactive oxygen species [15]. Pathogenic changes that are associated with diabetic nephropathy are due to hormones such as transforming growth factor-beta and angiotensin II [16].

Age

However, relatively little is known about the clinical course of CKD in older individuals. Renal damage is common in elderly people of aged above 65[17,18,19]. Age is recognised as independent risk factor for renal disease [20] According to the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (k/DOQUI)

Guidelines

- Elderly population were screened, more than one-half of subjects are and found as CKD stages 3-5(GFR 60ml/min per $1.73m^2$) [21]
- 10yrs follow-up study revealed that Age group 50above are prone to CKD and Age 60 above are at CKD stage-III or ESRD, irrespective of their gender [22]

Hypertension

SALT restriction should be indicated in antihypertensive therapy and diuretic therapy for better outcomes [23].

Experimental animal model shows that hypertension can be lead to kidney damage, which is because of decrease ability of kidney to eliminate salt. Experiment was done on dogs that was found that 70% of kidney damage is seen and developing hypertension within few days. Due to increase intake of salt may lead to Hypertension thus in-turn leads to the progression of CKD disease [24]. In another experimental study, high salt diet is given to the rats which shows high increase in levels of transforming growth factor beta, polypeptides associated with kidney fibrosis thus leads to kidney damage [25]. oxidative stress played an important role in the production of renal damage [26].

Treatment

Treatment of chronic kidney disease (CKD) can slow its progression to end-stage renal disease

(ESRD). Angiotensin-converting enzyme (ACE) inhibitors and angiotensin-II receptor blockers are used in order to maintain blood pressure in CKD [27]. National kidney foundation was suggesting that combination therapy like ARB's and ACE inhibitors can be used to decline the proteinuria in the patients who are with renal disease [28]. By monitoring the creatinine levels in early stages if (serum creatinine>1.4 mg/dl.) then we can choose the ACE inhibitors and we can stop the progress of the disease with mono therapy of ACE inhibitors. Thus we can prevent progression of disease [29]

Combination therapy of ACE inhibitors and ARB's is better option for complete blockade of RAAS which gives better Reno protection. A study shown that patients with stable hypertension and advanced CKD, who are receive therapy with Angiotensin-converting enzyme (ACE) inhibitors and angiotensin-II receptor blockers exhibit an association with low risk of long-term dialysis [30].

Pentoxifylline is Reno-protective drug when it is given in combination with Angiotensin-converting enzyme (ACE) inhibitors and angiotensin-II receptor blockers, we can decrease the progress of CKD stages [30].

A mono-therapy of short acting Dihydropyridine calcium channel blockers (CCB`s) worsens proteinuria and accelerate renal damage in both animal models and human with hypertension or diabetes. But when we give Non-dihydropyridine CCB`s in combination with ACE inhibitors. It acts as Reno-protective [31].

Vitamin-D Supplementation

Vitamin-D involves numerous regulatory processes in the body [32]. Vitamin-D is observed in the form of calciferol, hydroxylation of calciferol occurs in Liver then it forms into 25-hydroxycalciferaol. This 25-hydroxycalciferaol undergoes one more hydroxylation in kidney and develops 1,25 dihydroxycalciferol.

Vitamin-D is not only restricted to its classical function of maintaining Calcium and phosphate homeostasis but also Vitamin-D plays crucial role in cell differentiation and anti-proliferative factors with action upon different tissues i.e., includes immune system, renal system and cardio vascular system [33-34].

Iron Supplements

Kidney maintains RBC by erythropoietin production, Impaired production of erythropoietin by failing kidneys leads to anaemia condition [35].

Iron based phosphate binders have greater absorption properties, could represent novel approach for correcting Anaemia and hyper phosphatemia in CKD patients [36]

Conclusion

Insolvent of Clinical pharmacist in the therapy, can guide the physician about proper combination of drug therapy in order to stop the progression of CKD and thus decrease in pill burden may attains medication adherence.

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