SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 8 | August 2022 - Peer Reviewed Journal

A BRIEF REPORT TO STUDY RISK ASSESMENT OF CKD IN TYPE-II DIABETIC AND HYPERTENSIVE PATIENTS

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Article DOI: https://doi.org/10.36713/epra11005
DOI No: 10.36713/epra11005

ABSTRACT

Chronic kidney disease (CKD) is a long-term pathological condition with loss of function over several months to years. In the present study the CKD risk assessment in diabetic, hypertension is assessed using CKD assessment questionnaire, GFR and other biochemical parameters. In the present study 1270 patients were identified with risk of CKD in which 250 patients were dropped due to various reasons, 1020 patients data was studied and analyzed as per our objectives. The findings suggest that the CKD risk is more in elder patients than younger patients with diabetics and hypertension. Females are at more risk to CKD when compared to males. When BMI was analyzed the Female Obese patients are 90% significant risk to CKD followed by obese male. 95% significant risk was observed for CKD in house wives, Govt employees followed by Private employees with sedentary life style. Family history of CKD in diabetic and hypertension was analyzed then there is no significant difference among them. When education status was analyzed in hypertension and diabetes patients then there is no significant difference among them. when GFR was analyzed then 95% significant risk was observed in stage-1 vs stage-3A, 95% significant risk was observed in stage-1 Vs stage-3B and 99% significant risk was observed between stage-1 Vs stage-5. It is concluded that increased age are at more risk, in Gender Females are more risk than males, in BMI higher BMI are more risk, Family history was Independent ,in Occupation house wives are more risk , in GFR – Stage 5 are more risk and in Social history was Independent.

KEY WORDS: *Age, Gender, BMI, GFR, Social history, family history, Occupation*

INTRODUCTION

Chronic kidney disease (CKD) is a progressive loss of function over several months to years, characterized by gradual replacement of normal kidney architecture with interstitial fibrosis[1]. CKD is categorized by the level of kidney function, based on glomerular filtration rate (GFR), into stages 1 to 5, with each increasing number indicating a more advanced stage of the disease, as defined by a declining GFR. This classification system from the National Kidney Foundation's Kidney Dialysis Outcomes and Quality Initiative (K/DOQI) also accounts for structural evidence of kidney damage. CKD stage 5, previously referred to as end-stage renal disease (ESRD), occurs when the GFR falls below 15 mL/min per 1.73 m2 body surface area. The patient with stage 5 CKD requiring chronic dialysis or renal transplantation for relief of uremic symptoms is said to have ESRD[2].

About one in ten people have chronic kidney disease. African Americans, American Indians, Hispanics, and South Asians, particularly those from Pakistan, Sri Lanka, Bangladesh, and India, are at high risk of developing CKD. African Americans are at greater risk due to a prevalence of hypertension among them. As an example, 37% of End Stage Kidney Disease cases in African Americans can be attributed to high blood pressure, compared with 19% among Caucasians[3]. People with high blood pressure and diabetes are also at high risk of suffering from CKD than those people without these underlying conditions. About one of five adults with hypertension

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and one of three adults with diabetes have CKD. Other health conditions that may lead to CKD are obesity, high cholesterol, afamily history of the disease, lupus, and other forms of cardiovascular diseases. Chronic kidney disease was the cause of 956,000 deaths globally in 2013, up from 409,000 deaths in 1990[4].In Canada 1.9 to 2.3 million people were estimated to have CKD in 2008[5].The U.S. Centers for Disease Control and Prevention found that CKD affected an estimated 16.8% of U.S. adults aged 20 years and older in the period from 1999 to 2004[6].UK estimates suggested that in 2007 8.8% of the population of Great Britain and Northern Ireland had symptomatic CKD[7].

CKD development and progression is insidious. Patients with stage 1 or 2 CKD usually do not have symptoms or metabolic derangements seen with stages 3 to 5, such as anemia, secondary hyperparathyroidism, cardiovascular disease, malnutrition, and fluid and electrolyte abnormalities that are more common as kidney function deteriorates[8]. Uremic symptoms (fatigue, weakness, shortness of breath, mental confusion,nausea, vomiting, bleeding, and anorexia) are generally absent in stages1 and 2, minimal during stages 3 and 4, and common in patients with stage 5 CKD who may also experience itching, cold intolerance, weight gain, and peripheral neuropathies[9]

Susceptibility factors increase the risk for kidney disease but do not directly cause kidney damage. Susceptibility factors include advanced age, reduced kidney mass and low birth weight, racial or ethnic minority, family history, low income or education, systemic inflammation, and dyslipidemia.Initiation factors initiate kidney damage and can be modified by drug therapy[10]. Initiation factors include diabetes mellitus, hypertension, autoimmune disease, polycystic kidney disease, and drug toxicity. Progression factors hasten decline in kidney function after initiation of kidney damage[11]. Progression factors include glycemia in diabetics, hypertension, proteinuria, and smoking. Most progressive nephropathies share a final common pathway to irreversible renal parenchymal damage and ESRD(Fig-1). Key pathway elements are loss of nephron mass, glomerular capillary hypertension, and proteinuria[12].

Angiotensins converting enzyme inhibitors (ACEIs) or angiotensin II receptor antagonists (ARBs) are used, as they have been found to slow the progression.They have also been found to reduce the risk of major cardiovascular events such as myocardial infarction, stroke, heart failure, and death from cardiovascular disease when compared to placebo in individuals with CKD[13].

Low-protein, low-salt diet may result in slower progression of CKD and reduction in proteinuria as well as controlling symptoms of advanced CKD to delay dialysis start[14]. At stage 5 CKD, renal replacement therapy is usually required, in the form of either dialysis or a transplant[15].

RISK FACTORS

DIABETES MELLITUS**:**It is a leading cause of CKD and ESRD in both developed and developing countries[16]. Mechanism that lead to kidney disease in diabetes include hyperfiltration injury, advanced glycosylation end products, reactive oxygen species. At the molecular level, numerous cytokines, growth factors and hormones such as transforming growth factor-beta and angiotensin II cause pathologic changes associated with diabetic nephropathy[17].Eight percent of new patients with type 2 DM already have proteinuria at diagnosis.After the onset of proteinuria, the subsequent 10-year risk of progressive CKD is 11%[18]. Thus, about half of those with type 2 DM will develop nephropathy and 10% of these individuals will experience progressive loss of renal function[19].

HYPERTENSION: Hypertension has long been a defined risk factor for both CKD and ESRD, and accounts for 27% of all ESRD patients in the United States and 28% of hemodialysis patients in Turkey[20]. Systemic hypertension is transmitted to intraglomerular capillary pressure leading to glomerulosclerosis and loss of kidney function; thus variable risk of impaired renal function has been reported among hypertensive patients[21]. According to the MRFIT study, adjusted relative risk of reaching ESRD was 1.9 for high normal blood pressure,

For stage I, 6.0 for stage II, 11.2 for stage III, and 22.1 for stage IV hypertension[22].

The main objectives of the study are designed to predict chronic kidney disease in hypertension and diabetic patients go through biochemical, other physical examination at regular intervals, and assess the risk of developing CKD in patients with hypertension and diabetes.

MATERIALS AND METHODS

A Prospective observational study was conducted at nephro,general medicine and surgery department in, a tertiary care hospital for a period of 18 months June(2020) to December (2021).

The data was collected from general medicine and surgery department by interviewing the patients or care providers. The data collection format was verified and authenticated by the hospital preceptors for the study. The data collection form mainly contains the demographic details of the patient and diagnosis {biochemical parameters and physical examination}**,** UNC Kidney Centre screening tool –Questionnaires. Study involved 1270 subjects.

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Statistical Analysis: Descriptive statistics was done by using one way ANOVA by Bonferroni's Multiple Comparison Test to determine mean and standard deviation of collected data.

RESULTS

In the present study 1270 patients were involved in which 250 patients were dropped due to various reasons, 1020 patients data were studied and analyzed as per our objectives. As statistical analysis of the collected data was done by using one way ANOVA by Bonferroni's Multiple Comparison Test the resulted graphs /figures were obtained as per this test. **TABLE -1** indicates socio demographic background which includes standard deviation ,mean, score difference and CKD risk in various parameters as considered in our study .**FIGURE -1** describes the gender wise score of CKD assessment here, the significance score difference was observed between various age groups as show respectively male Vs female was 95% significant. This shows the risk of CKD in diabetic & hypertension is gender dependent. Male patients are at less risk factor when compared to female patients. While **FIGURE-2** express the age wise score of CKD assessment were, The significance score difference was observed between various age groups considered as 41-45 vs 46-50 was 90% : 41-45 vs 51-55 was 95% and in 41-45 Vs 56-60 & 61-65 was 99% significant. This indicates the risk of CKD in diabetic & hypertension is age dependent. Low age patients are at less risk factor when compared to higher age patients. The BMI wise score of CKD assessment score is seen in **FIGURE-3**. The significance score difference was observed between various age groups taken as Female Obese Vs Male Normal was 90%, which concludes the risk of CKD in diabetic & hypertension is BMI dependent. Normal patients are at less risk factor when compared to higher BMI patients. In case of Family history wise score of CKD assessment, the significance score difference was observed between various groups as show respectively are not significant. To sum up the risk of CKD in diabetic & hypertension is family history is independent as shown in **FIGURE-4.** Further more social history wise score of CKD assessment observed through **FIGURE-5**. Whereas significance score difference observed between various groups was not significant. Hence the risk of CKD in diabetic & hypertension is social history is independent.

However GFR wise score of CKD assessment by means of **FIGURE-6** shows that the significance score difference was observed between various groups as Stage 1 vs stage 3A was 95% ,Stage 1 vs stage 3b was 95% , Stage 1 vs Stage 5 was 99% and Stage 1 vs stage 4 was 95% significant. Thus the risk of CKD in diabetic & hypertension is age dependent. Patients with decrease in GFR are at higher risk factor when compared to higher age patients.

FIGURE-7 notes occupation wise score of CKD assessment. Here the significance score difference was observed between various age groups like farmer vs private employee was 95%, Govt employee vs private employee was 90% and private employee vs house wife was 95% significance. Therefore the risk of CKD in diabetic & hypertension is occupation dependent. Patients who are house wife's are at higher risk factor when compared to other patients. Finally **FIGURE -8** express Education status wise score of CKD assessment were significance score difference was observed between various groups was not significant. This shows the risk of CKD in diabetic & hypertension is education status is independent.

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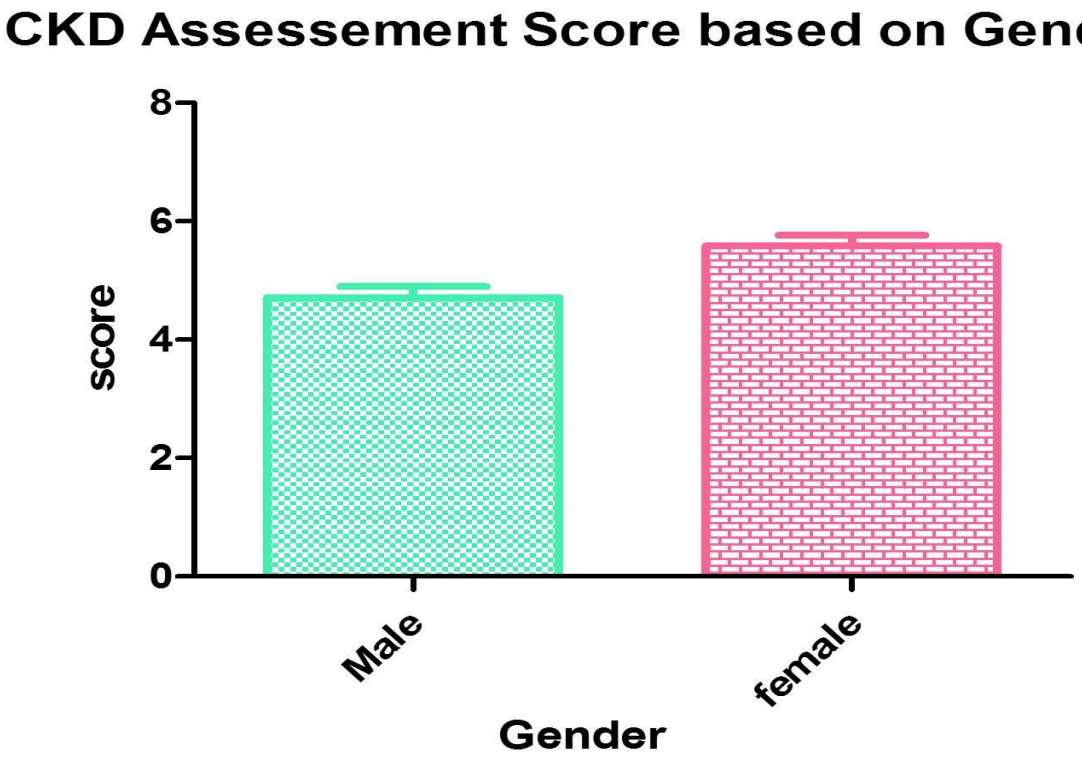

FIGURE-1 CKD ASSESSMENT SCORE BASED ON GENDER

Socio Demo Category	Sub Category		Mean And Standard deviation	Score Difference	CKD Risk In DM And HTN
Gender	Male		4.7 ±0.183	Significant	Dependent
	Female		5.58±0.183		
Age	41-45		3.27±0.46	Significant	Dependent
	46-50		4.70±0.311		
	51-55		5.44±0.259		
	56-60		5.41±0.117		
	61-65		5.79±0.300		
BMI	Male	Normal	4.63±0.249	Significant	Dependent
		Obese	4.84±0.279		
		Lean	5.00±0.01		
	Female	Normal	5.29±0.240		
		Obese	6.00±0.226		
		Lean	7.00±0.01		
GFR	Stage-1		3.86±0.329	Significant	Dependent
	Stage-2		4.86±0.229		
	Stage-3A		4.86±0.229		
	Stage-3B		5.45±0.303		
	Stage-4		5.91±0.285		
	Stage-5		7.25±0.250		

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Family history	Father	5.54± 0.475	Not significant	Independent
	Brother	6.00± 1.00		
	Husband	6.00± 0.001		
	Father and brother	6.50± 0.500		
Social history	Alcoholic	5.54± 0.184	Not significant	Independent
	Smoker	6.00± 0.447		
	Toddy	6.00± 0.262		
	Alcoholic and smoker	6.50± 0.239		
Occupational	Farmer	5.27±0.001	Significant	Dependent
	Govt Employee	5.46± 1.00		
	Pvt Employee	4.19± 0.00		
	Housewife's	5.71± 0.500		
Educational	Illiterate	5.30±0.291	Not significant	Independent
	Primary	5.03±0.244		
	Secondary	4.58±0.417		
	Intermediate	5.75±0.629		
	Degree	4.15±0.406		

TABLE-1: Sociodemographics Details

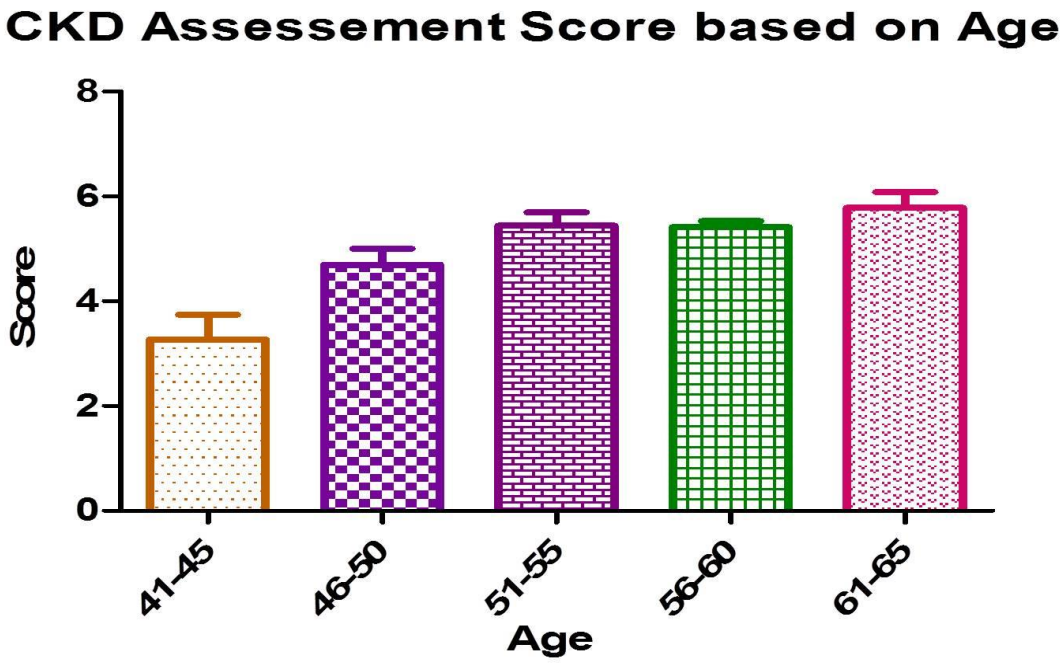

FIGURE-2 CKD ASSESSMENT SCORE BASED ON AGE

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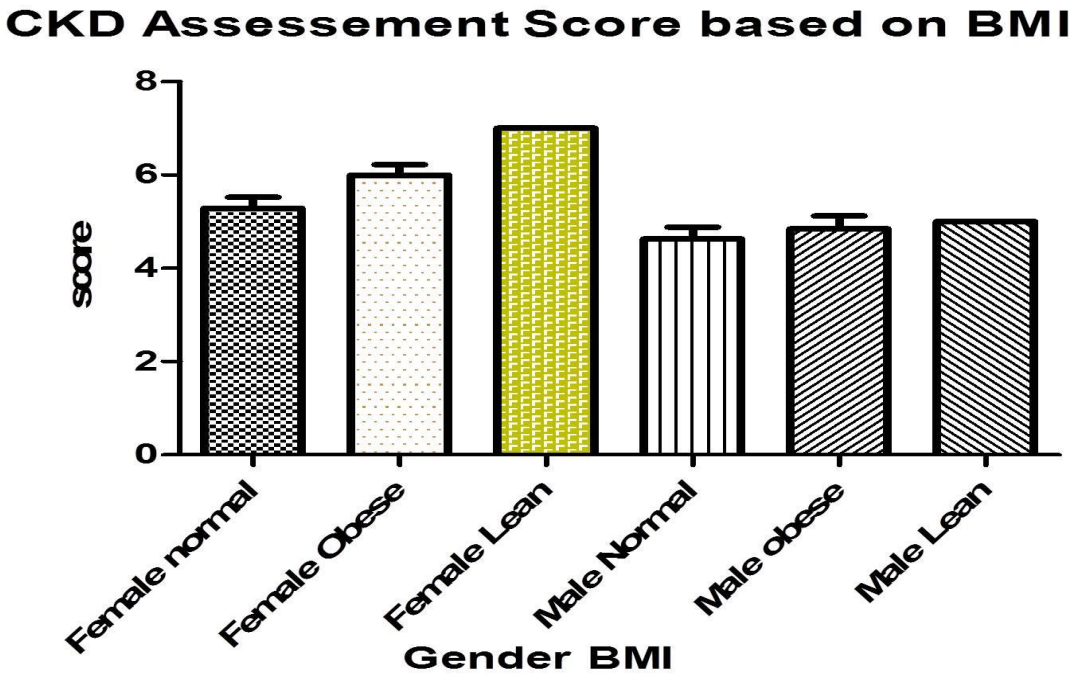

FIGURE-3 CKD ASSESSMENT SCORE BASED ON BMI

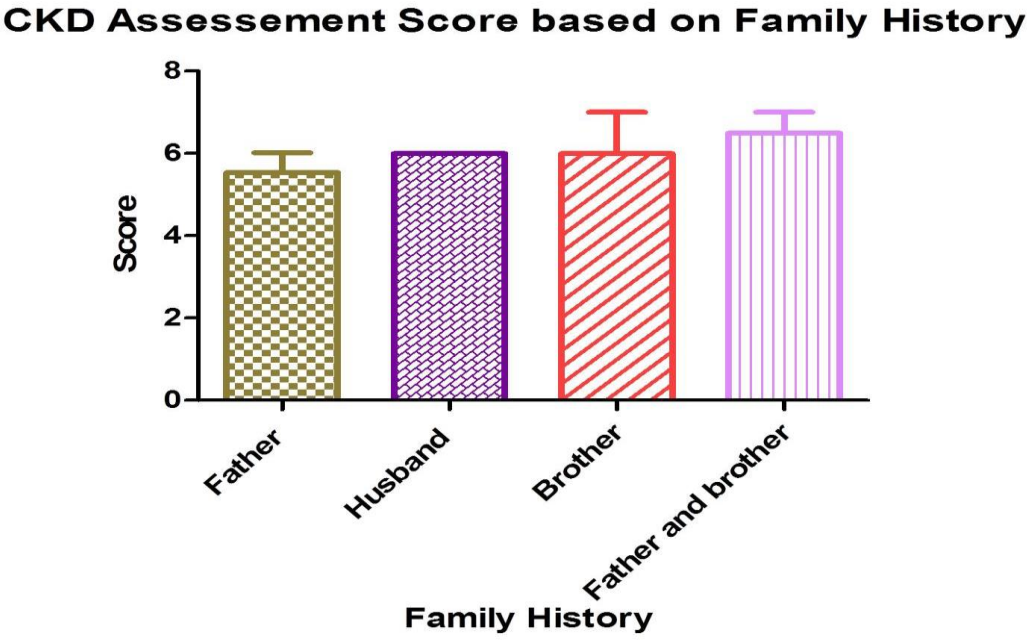

FIGURE-4 CKD ASSESSMENT SCORE BASED ON FAMILY HISTORY

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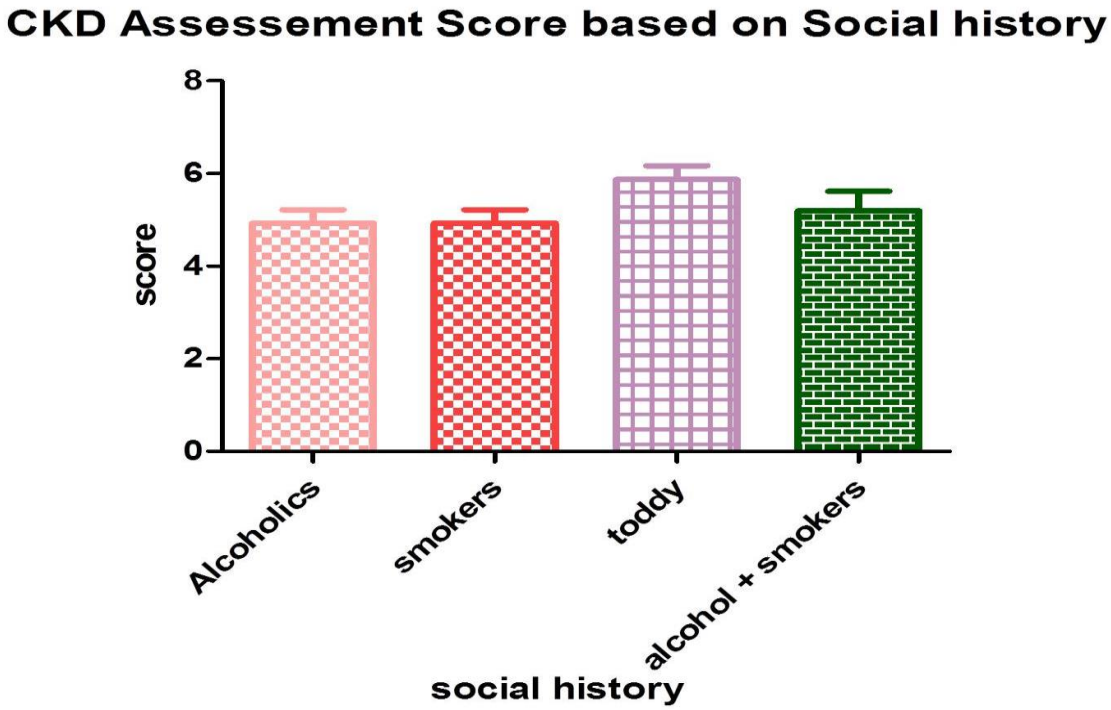

FIGURE-5 CKD ASSESSMENT SCORE BASED ON SOCIAL HISTORY

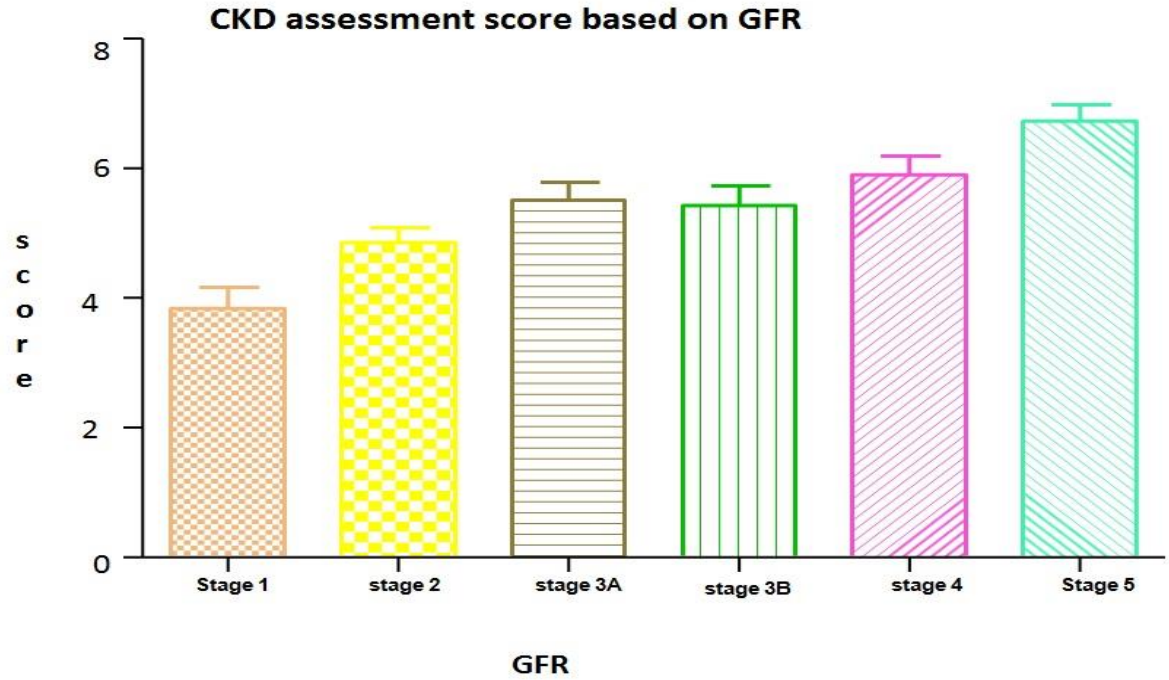

FIGURE-6 CKD ASSESSMENT SCORE BASED ON GFR

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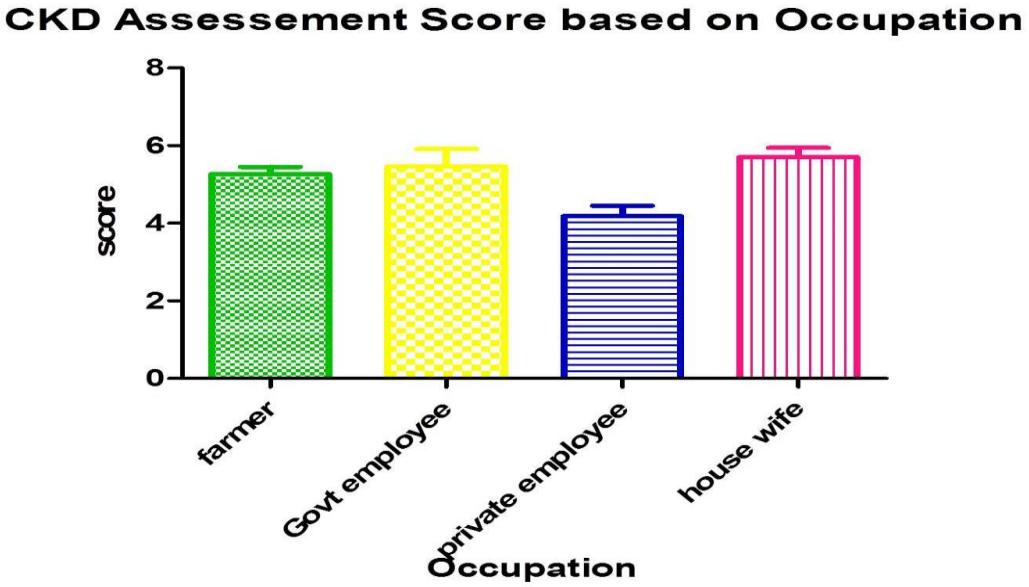

FIGURE- 7 CKD ASSESSMENT SCORE BASED ON OCCUPATION

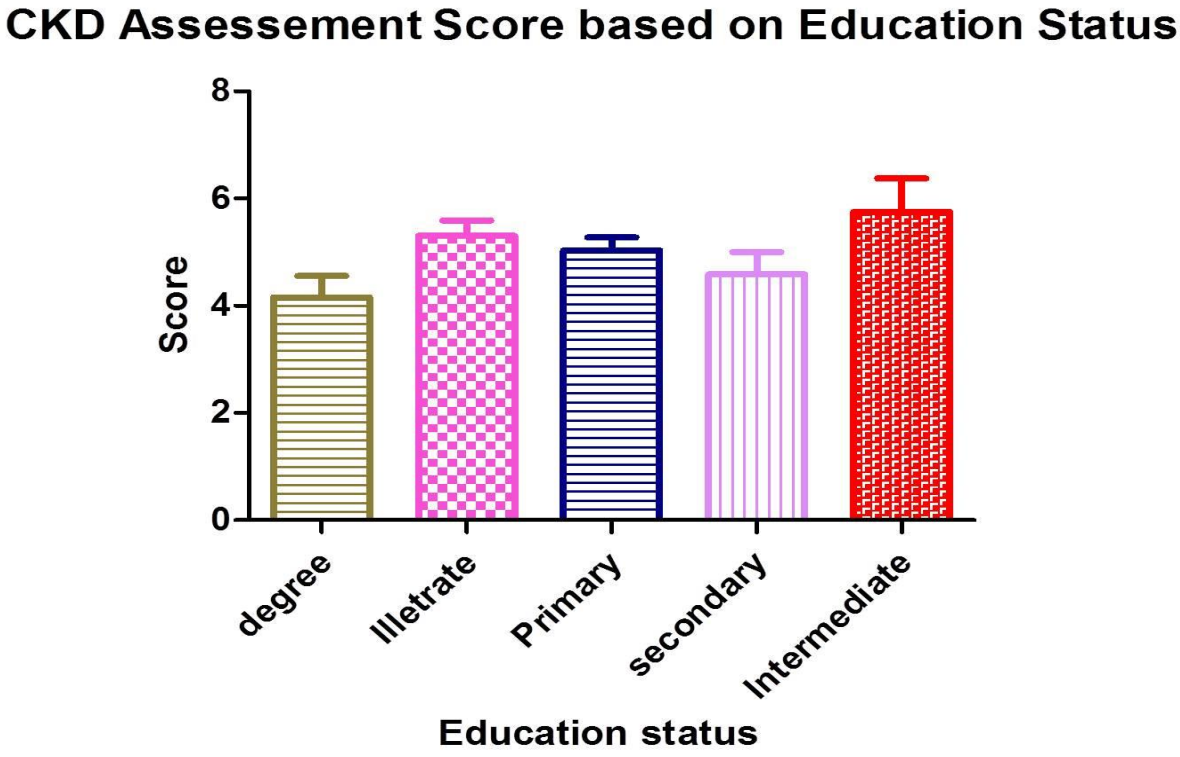

FIGURE-8 CKD ASSESSMENT SCORE BASED ON EDUCATION STATUS

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DISCUSSION

"**An Observational study For Risk Assessment Of CKD In Type-II Diabetic And Hypertensive Patients** ", was conducted in a tertiary care hospital considering patients from nephro, general medicine and surgery department. The data was collected for 1270 patients using data collection forms.

Gender wise score of CKD assessment states the risk in diabetic & hypertension is gender dependent. Male patients are at less risk factor when compared to female patients. Whereas the study conducted by Po-Ya[23] Chang determined sex-specific prediction models for risk factors for renal progression. Moreover, we revealed proteinuria as the most crucial risk factor for male patients and poor glycemic control as the crucial risk factor for female patients. Poor blood pressure control was a mutual risk factor for male and female patients.

The age wise score of CKD risk assessment in diabetic & hypertension is age dependent. Low age patients are at less risk factor when compared to higher age patients. As per the study conducted by Rumeyza Kazanciog lu[24] Renal function decreases with age in both men and women. Among the elderly population, more than one-half of the subjects screened had CKD stages 3–5 (GFRo60 ml/min per 1.73m2) according to the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines[25]. Thus, the elderly population is more prone to develop CKD after various renal insults as similar to our results.

According to the study conducted by Maria valeria pavan[26] .One of the strongest yet modifiable risk factors for ESRD in the twenty-first century is obesity. Glomerular hypertrophy and hyper filtration may accelerate kidney injury by increasing capillary wall tension of the glomeruli and decreasing podocyte density. Obesity may contribute to the pathogenesis of kidney damage through inflammation, oxidative stress, endothelial dysfunction, prothrombiotic state, hypervolemia, and adipokine derangements[27]. Infact our study BMI wise score of CKD risk in diabetic & hypertension is BMI dependent. Normal patients are at less risk factor when compared to higher age patients.

The Family history wise score of CKD e risk in diabetic & hypertension is family history is independent. However study performed by Dept of nephrology[28] mostly father diabetic patient may also have diabetes which may be predisposing factor of CKD. In social history wise score of CKD assessment score were not significant. This shows the risk of CKD in diabetic & hypertension is social history is independent. But study conducted by McClellan WM[29], Smoking can increase the CKD risk through pro inflammatory state, oxidative stress, prothrombotic shift, endothelial dysfunction, glomerulosclerosis and tubular atrophy.18 In a study where 7476 non diabetic participants were enrolled, smoking 420 cigarettes per day increased the risk of CKD.22 In another study, each additional five smoked cigarettes per day was associated with an increase in serum creatinine 40.3 mg/dl by 31%[30].

GFR wise score of CKD assessment in diabetic & hypertension is age dependent. Patients with decrease in GFR are at higher risk factor when compared to higher age patients.Occupation wise score of CKD risk assessment in diabetic & hypertension is occupation dependent. Patients who are house wives are at higher risk factor when compared to other patients.

Education status wise score of CKD assessment were not significant. Thus the risk of CKD in diabetic & hypertension is education status is independent. Even though the study conducted GramsME[31] et al by said that illiterate are at more risk of CKD than other individuals.

CONCLUSION

Chronic kidney disease (**CKD**), also called as chronic kidney failure, means a gradual loss of kidney function over time, i.e. it has lasting damage to kidneys that can get worse over time. If the damage is severe, kidneys may stop working. This is called kidney failure and it means there is need for dialysis or a kidney transplant.

CKD is when kidneys are damaged and lose their ability to filter waste and fluid out of blood. Waste can build up in body and harm your health of individual. Kidney failure or end-stage renal disease (ESRD) is when kidneys have stopped working well enough for individual to survive without dialysis or a kidney transplant.

On the whole In order to assess the risk factors in patients with diabetes and hypertension, A prospective observational study has been initiated, thus a total of 1270 cases have been enrolled out of which 1020 were selected into the study were factors like Age, Gender, BMI, Family history, Social history, occupation, GFR were used to assess the risk factor. Both males and females of different age groups have been observed through the study, which concluded that

Age – risk of CKD gradually increasing with age. **Gend**er – Females are at more risk than males.**BMI** – Higher BMI is risky. **Occupation** – house wives are more in risk. **GFR** – Stage 5 are at higher risk, where as factors like family history, social history and educational status are independent in risk assessment.

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SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 8 | August 2022 - Peer Reviewed Journal

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