**Prof Medical Research Consultancy Center – MRCC**

**A proposal on:** **The common risk factors for chronic kidney disease (CKD) in Sudan**

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**Co. investigators**:

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**A proposal submitted for the partial fulfillment of the requirements of the research Methodology Course Level 1, 2024**

**Introduction and Review of literature**

One of the most concerning health issues worldwide is the chronic kidney disease (CKD) with escalating incidence and prevalence [1]( Mitrofanova, et al. 2023). Chronic kidney disease is highly prevalent (10-13% of the population), irreversible, progressive, and associated with higher cardiovascular risk. Patients with this pathology remain asymptomatic most of the time, presenting the complications typical of renal dysfunction only in more advanced stages. Its treatment can be conservative (patients without indication for dialysis, usually those with glomerular filtration rate above 15 ml/minute) or replacement therapy (hemodialysis, peritoneal dialysis, and kidney transplantation) [2]( Ammirati, 2020).

Many risk factors have been found to be associated with CKD such as, high percentages of risk factors were indicated in a family history (FH) of DM representing 72%, followed by family history of hypertension, recurrent urinary tract infection, DM, family history of renal disease, hypertension, and analgesic abuse, constituting 65%, 59%, 26%,26%, 25%, and 22%, respectively [3]( Ginawi, et al. 2013).

Sudan

**Review**

CKD is widely prevalent and independently increases cardiovascular risk. Cardiovascular risk prediction tools derived in the general population perform poorly in CKD. Through large-scale proteomics discovery, this study aimed to create more accurate cardiovascular risk models. Elastic net regression was used to derive a proteomic risk model for incident cardiovascular risk in 2182 participants from the Chronic Renal Insufficiency Cohort. The model was then validated in 485 participants from the Atherosclerosis Risk in Communities cohort. All participants had CKD and no history of cardiovascular disease at study baseline when ∼5000 proteins were measured. The proteomic risk model, which consisted of 32 proteins, was superior to both the 2013 ACC/AHA Pooled Cohort Equation and a modified Pooled Cohort Equation that included estimated glomerular filtrate rate. The Chronic Renal Insufficiency Cohort internal validation set demonstrated annualized receiver operating characteristic area under the curve values from 1 to 10 years ranging between 0.84 and 0.89 for the protein and 0.70 and 0.73 for the clinical models. Similar findings were observed in the Atherosclerosis Risk in Communities validation cohort. For nearly half of the individual proteins independently associated with cardiovascular risk, Mendelian randomization suggested a causal link to cardiovascular events or risk factors. Pathway analyses revealed enrichment of proteins involved in immunologic function, vascular and neuronal development, and hepatic fibrosis. In two sizeable populations with CKD, a proteomic risk model for incident cardiovascular disease surpassed clinical risk models recommended in clinical practice, even after including estimated glomerular filtration rate. New biological insights may prioritize the development of therapeutic strategies for cardiovascular risk reduction in the CKD population [4]( Deo, et al. 2023).

Chronic kidney disease (CKD) is a condition characterized by the gradual loss of kidney function over time and it is a worldwide health issue. The estimated frequency of CKD is 10% of the world's population, but it varies greatly on a global scale. In absolute terms, the staggering number of subjects affected by various degrees of CKD is 850,000,000, and 85% of them are in low- to middle-income countries. The most important risk factors for chronic kidney disease are age, arterial hypertension, diabetes, obesity, proteinuria, dyslipidemia, and environmental risk factors such as dietary salt intake and a more recently investigated agent: pollution [5]( Mallamaci, et al. 2024).

**Rationale**

Renal failure is one of the most encountered health problems in Sudan withing increasing social and financial burden. The majority of the cases of the kidney dysfunction starts as CKD and deteriorated to progress into end-stage renal disease. The most encountered expected risk factors are increasing prevalence of type 2 diabetes, hypertension, and other undisclosed factors. However, there is a complete absence of literature from Sudan in this context. Therefore, the present study is aiming at identifying the most common risk factors that associated the increasing burden of CKD in Sudan.

**Objectives**

**General Objective**

To identify the common risk factors for chronic kidney disease (CKD) in Sudan

**Specific Objectives**

1. To identify the relationship between DM and HTN and increasing epidemiology of CKD.
2. To explore (if any) risk factors linked to increasing epidemiology of CKD.

**Materials and Methods**

This will be a descriptive cross-sectional study and will be conducted in Northern Kordofan state during the period from March 2024 to May 2025. About 3000 volunteers will be selected for this study from 10 localities in NK. Each individual in the selected localities will be eligible to selected by simple random method regardless of gender, age, education, occupation or other factors.

A purposeful questionnaire will be designed comprising essential information about CKD (see the appendix).

Urine and blood samples will be obtained from each respondent.

**Urine analysis**

**Blood analysis**

**Blood pressure**

**Body Mass index**

**Estimation and categorization of GFR**

**Data Analysis:** The obtained data will be analyzed using a computer software SPSS version 24 (Chicaco, USA.). Frequencies, percentages, and cross-tabs will be calculated. Considering 95% confidence level, chi square test will be calculated, P value < 0.05 will be considered statistically significant.

**Informed Consent**: each participant will be asked to sign a written ethical consent before the interview.

**Ethical Approval**: This proposal will be submitted to HREC at MRCC to obtain Ethical approval letter.

**Time Frame**

|  |  |  |  |
| --- | --- | --- | --- |
| No | Task | Starting date | Ending date |
| 1 | Data collection | 20/4/2024 | 15/10/2024 |
| 2 | Data processing  | 20/10/2024 | 25/12/2024 |
| 3 | Data analysis | 1/1/2025 | 10/2/2025 |
| 4 | Reporting  | 20/2/2025 | 25/2/2025 |
| 5 | Manuscript drafting | 1/3/2025 | 1/7/2025 |
| 6 | Publication | 5/7/2025 | 30/12/2025 |

**Budget**

**Materials**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Item** | **Quantity** | **Price/item** | **Total**  |
| **1** | **gloves** | **250** | **100** | **25000** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Stationary**

|  |  |  |
| --- | --- | --- |
| **No** | **Item** | **Cost** |
| **1** | **Paper** | **4000** |
| **2** | **Transportation** | **50000** |
|  |  |  |
|  |  |  |
|  |  |  |
|  | **Total** |  |

**Personnel**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Name** | **Degree** | **Award/month** | **Total** |
| **1** | **Dr. Sideeg Gammaa** | **MD** | **5000** | **50000** |
| **2** | **Sarrah**  | **MSc** | **4000** | **40000** |
|  | **Telal**  | **MBBS** | **3000** | **30000** |
|  | **Ali** | **Diploma** | **2000** | **20000** |
|  |  |  |  |  |
|  | **Total**  |  |  |  |

**Table of Total**

|  |  |
| --- | --- |
| **Material s** | **300000** |
| **Stationary**  | **150000** |
| **Personal**  | **100000** |
| **Total budget** | **750000SGD** |

**Expected outcomes**

**1-**There is increasing epidemiology of DM and HTN which is responsible of the increasing burden of CKD in north Kordofan.

2-Expecting to find other risk factors linked to SKD in this population, such as, water composition, undetermined use of AIALGIS, Genetic factors

**Utility of outcomes**

1-Raise the awareness, control of DM and HTN, implementation of screening and follow up of those with impair kidney function.

2-Descolose the unknown risk factors, and targeted with specific measures.

**References**

1. Mitrofanova A, Merscher S, Fornoni A. Kidney lipid dysmetabolism and lipid droplet accumulation in chronic kidney disease. Nat Rev Nephrol. 2023 Oct;19(10):629-645. doi: 10.1038/s41581-023-00741-w.
2. Ammirati AL. Chronic Kidney Disease. Rev Assoc Med Bras (1992). 2020 Jan 13;66Suppl 1(Suppl 1):s03-s09. doi: 10.1590/1806-9282.66.S1.3.
3. Ginawi IA, Ahmed HG, ASHANKYTY IM, Altamimi T, Almogbel M, Alsuedaa A, Akbar D, Fatma Albeladi F. Survey For Potential Risk Factors For Survey For Potential Risk Factors For Survey For Potential Risk Factors For Susceptibility To Chronic Kidney Susceptibility To Chronic Kidney Susceptibility To Chronic Kidney Disease In Hail Region, KSA. Management in health 2013; XVII/122013; 31-36.
4. Deo R, Dubin RF, Ren Y, Murthy AC, Wang J, Zheng H, Zheng Z, Feldman H, Shou H, Coresh J, Grams M, Surapaneni AL, Bhat Z, Cohen JB, Rahman M, He J, Saraf SL, Go AS, Kimmel PL, Vasan RS, Segal MR, Li H, Ganz P. Proteomic cardiovascular risk assessment in chronic kidney disease. Eur Heart J. 2023 Jun 20;44(23):2095-2110. doi: 10.1093/eurheartj/ehad115.
5. Mallamaci F, Tripepi G. Risk Factors of Chronic Kidney Disease Progression: Between Old and New Concepts. J Clin Med. 2024 Jan 24;13(3):678. doi: 10.3390/jcm13030678.
6. **, Appendix**

**Prof Medical Research Consultancy Center- MRCC**

**Prevalence of chronic renal failure in adults in Hail, Saudi Arabia**

**Questionnaire**

Name:…………………………………………………………..…… Nick name …………………………

Residence ……………………………………………. Mobile…………………………………….

Age ……………………………………………………Gender …………………………………..

Marital Status …………………………………… Occupation………………………………..

Height …………………………………………Cm…………………… weight …………………………… Kg

Smoking Habits ………………………………….. if yes Duration ………………….. years

Intensity ……………………………. Cigarette per/day

History of Chronic illness ……………………………… if yes identify ………………………………………………………………………………………………………………………..

Frequency of passed renal diseases …………………………………………… CRF…………….

Family history of CRF …………………….. if yes the number of family members …………………..

Type of drink water ………………………………………………………….

Frequency of water drink …………………………… L/per day

Use of Salts a) Normal b) lower c) increased, Use of Sugar

 a) Normal b) lower c) increased

Hypertension ……………………………….. Family History of hypertension …………………

DM ……………………………………………….. Family history of DM …………………………………..

Clinical Examination

General investigation …………………………………………………………………………………………………………………………………………………..

Blood pressure

Laboratory findings

Blood analysis :

 a) glucose ……………………… b) Creatinine ……………………………….

Urine analysis:

1. Sugar ……………………………… b) Acetone ……………………. C) protein …………………

Cytology

1. Cellular proliferative activity ……………………. If yes Identify

………………………………………………………………………………………………………………………….

1. Inflammatory infiltrate ……………………… if yes Identify

……………………………………………………………………………………………

Microbiology :

Bacterial isolate ……………………………………. If yes type ………………………………………

Sensitivity ……………………………………………………………………..

Serology …………………………………………………………………