miRNAs are a Novel Class of Regulatory Genes associated with Kidney Disease

Abstract

Introduction: Micro RNAs have been associated with chronic kidney disease progression and mortality. However, miR 223 and miR 192 role in CKD is poorly evaluated.

Aim: The learning aims to find the part of miR 223 and 192 in CKD patients

Methods: A cross-sectional observational study that included 450 study subjects out of which, 400 were cases and 50 were controls. Biochemical parameters were assessed by ELISA and miR expression levels were evaluated by quantitative PCR.

Results: It was found that miR 223 and 192 were significantly increased in the advancing stages of CKD when compared to controls.

Conclusion: miR 192 and miR 223 can be used as diagnostic markers of CKD.

Keywords: *disease, progression, stages of kidney disease, expression.*

Introduction

In the recent past, novel non-coding RNAs have been revealed taking new insights into the process of genetic factor parameters [1]. The size of the RNAs deviates them into short and long noncoding RNAs [2]. These non-coding RNAs harmfully control genetic factor appearance by deprivation of their mark mRNAs [3]. It is increasingly evident that miRNAs are expressed in usual and compulsive tissue which are intricate in kidney disease [4]. Research on microRNAs as probable biomarkers in the analysis and progression of diseases has gained traction in the current research field. These mRNAs play a crucial role in different cellular and regulatory processes like apoptosis, development, differentiation, and proliferation and also in the proper functioning of the kidney [5]. It is also obvious that various miRNAs are identified in saliva, serum, urine, and plasma. Earlier studies demonstrated that mRNAs exhibit unique pathology and can be used as potential diagnostic markers [6]. There is a growing demand to explore the part of extracellular miRNAs in the progression and growth of kidney disease i.e.; CKD [7-9]. However, most of the findings relevant to mRNA appearance in several organic solutions of CKD are unpredictable.

As the main objective of the present study is to find the connotation of miRNA with CKD.

Materials & Methods

This cross-section observational learning was shown from 2020 to 2024 in urban and rural health centers of Narayana Medical College and Hospital Nellore, Andhra Pradesh, India Informed consent is obtained from all the subjects and they were conducted after getting approval from the institutional ethical committee. Patients with CKD are considered in the current study. Patients in the age group 18 to 55 years, having been diagnosed with enduring kidney disease according to kidney disease, result quality initiative criteria were considered for the present study. Patients with a history of epilepsy, hypertensive encephalopathy malignancies, and infections. And 5^{th} stage of CKD patients were excluded from the present study. 5 ml of Venus blood samples were withdrawn from each subject and transferred in Serum vacuums at the sample collection center. The serum is separated using centrifugation at 3000 rpm for 13 actions at room temperature.

300- 500 µL serum sample Was used for micro-RNA extraction using a Mir easy serum/plasma kit. Extracted MIRNAs were converted into cDNA using U6 universal primer Further, each cDNA was checked for integrity using agricultural electrophoresis and nanodrop reading. Quantified cDNA was used for the quantitative expression analysis of two distinguished micro RNAs, that is, mir 223 and mir 192 in patient samples about control subjects, with real-time measurable PCR and 2 delta q technique.

Results

A total of 450 subjects comprising 400 CKD patient roles and 50 well controls were comprised in the present learning. The patients in the study were bifurcated into four groups and healthy controls. Four groups of diversion are based on the stages of CKD Phase 1 (n=100); Stage 2(n=100), stage 3(n=100), and Stage 4 (n=100) and healthy controls (n=50). The scientific and biological parameters of the learning subjects are potted as follows. (Table 1&2).

Table 1: Medical parameters of the study subjects

Variable	**Number of cases**
Mean Age (years) Males Females	 54 ± 2.3 52 ± 3.5
Males	235
Females	165
Mean weight (Kg)	58
Mean Height (m)	1.64
Mean BMI (kg/m^2)	24
Systolic BP (mm Hg)	120
Diastolic BP (mm Hg)	80
Family history of CKD (number)	120
Smoking (only males)	168
Chewing betel (both males and females)	98
Consumption of Alcohol (only males)	76
History of Hypertension	89
Diabetes mellitus	20
History of Malaria	55

Table 2: Biochemical parameters of the study subjects

Biochemical parameters (mean)	**Stage 1 CKD**	**Stage 2 CKD**	**Stage 3 CKD**	**Stage 4 CKD**	**Control**
Urea (mg/dL) Male Female	 37 38	 38 32	 44 42	 46 48	 32 30
Creatinine (mg/dl) Male Female	 1.4 1.32	 1.5 1.46	 2.1 2.5	 2.8 2.7	 1.0 1.1
eGFR (ml/min) Male Female	 68 62	 63 62	 42 43	 30 31	 110 108

Glucose (mg/g) Male Female	 79 77	 200 201	 76 74	 15 12	 70 43

Dual miRNAs be identified in the samples and serum echelons of miR 192 and miR223 concluded the CKD patients were brief in Figures 1& 2.

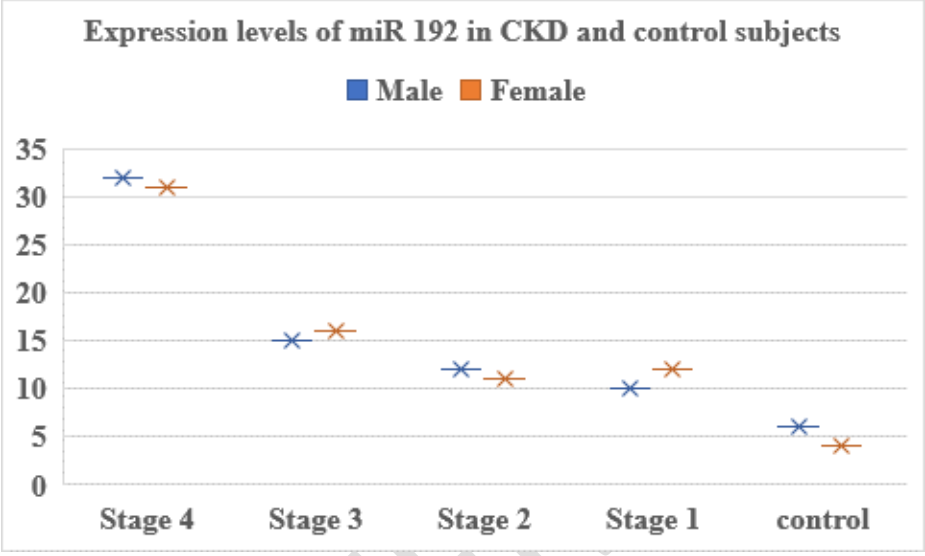

Figure 1: Expression of miR 192 in CKD of all stages

The appearance levels of miR 192 in females were higher than the males of the study.

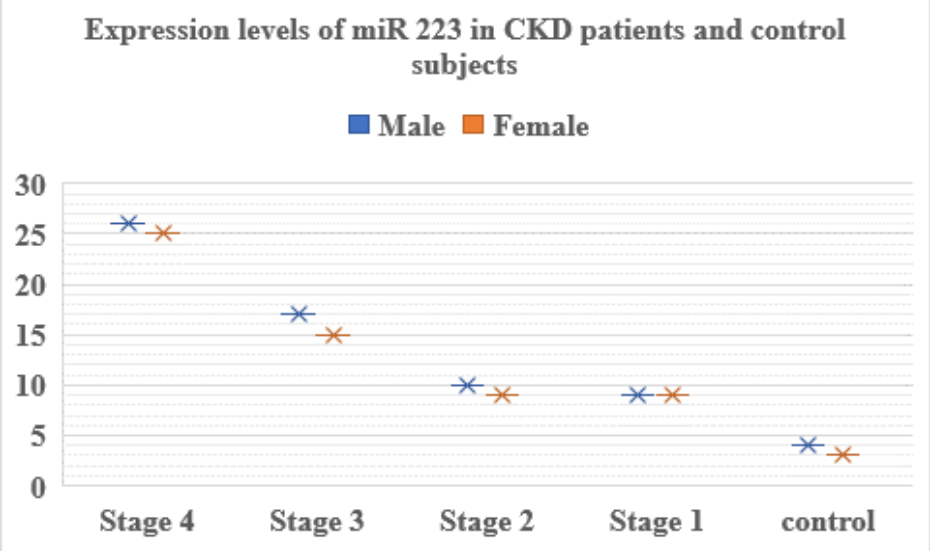

Figure 2: Expression of miR 223 in CKD of all stages

The appearance of miR 223 in males is more advanced than in the females of the CKD-affected individuals.

Discussion

The current study proved a significant increase in mingling miR 192 and miR 223 in patients with more unadorned stages of CKD.

Glomerular purification rate estimation meanwhile the serum levels of creatinine currently remain the most suitable marker of renal function for average practice and large epidemiological studies [10]. Albuminuria, proteinuria, and seric urea levels are useful indicators of renal character once controlled for urinary creatinine. However, these are not actual complex when detecting the first phases of CKD. Some other markers have been evaluated for their prognostic value of death, cardiac complications, and kidney disease evolution without victory [11-13]. miRNAs take attention as biomarker candidates to measure kidney disease severity [14,15]. One of the main compensations of miRNAs is their serac stability which makes them appropriate as a non-invasive biomarker [16]. So, one can hope that minor RNAs might prove to be a dependable marker to be valuable in clinical practice.

Quantification of miRNA stages in blood samples is performed by quantitative PCR. Various study squads have depicted the appearance of miRNA in plasma circulation in CKD advanced stages [17, 18]. A cohort study by Chen et al proved that miR-125b, miR 145, and 155 stages declined as the disease progressed [19]. The plasma levels of cardiac miRNAs as well decline with eGFR [20].

In difference to the above studies, in the present investigation, there is a growth in the levels of miR 223 and 192 are advanced stages of CKD.

As miR-223 is measured to be a marker of tenderness, it can be used as a marker for detecting CKD [21]. As per our study observations, miR 192 and miR 223 remain as prophetic markers of CKD identification and detection. The present investigation is the first study to identify the raised levels of miRNA in CKD patients.

Conclusion

To conclude, this is one of the rare studies to prove miRNAs be used as diagnostic markers in detecting chronic kidney disease. miR 192 and miR 223 are used as prognostic markers for identifying CKD disease progression.

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