Original Article

Emerging Therapies In Chronic Kidney Disease A Cross-Sectional Study

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Abstract

Background:CKD is a highly prevalent ailment worldwide that is typified by gradual deterioration of kidney function and many complications. Just in the last decades, there has been progress in the management and the effectiveness of therapy with special reference to the pharmacological use.

Objectives: To assess the effectiveness of novel treatments and treatment strategies in CKD in terms of renal prognosis, cardiovascular risk and patients' quality of life.

Study Desgin: A Cross-Sectional Study.

Place and Duration of study. January 2022 and july 2022 in a Urology MTI BKMC/MMC Mardan Pakistan

Methods: This study was a cross-sectional Study of 150 Patient with CKD at different stages of the disease. Participants were given conventional interventions with newly developed treatments such as SGLT2 inhibitors and fresh anti-inflammatory drugs. In the present study, we focused on collecting clinical data of the participants with eGFR, proteinuria and cardiovascular data over six months. Descriptive statistics using SD, comparison of the means and p-values for prevalence was used to determine the statistical significance for the data analyzed.

Results:SGLT2 inhibitors led to an enhancement of eGFR levels from 12% in 150 patients (mean age, 58.4 ± 6.2 years), ($p < 0.01$). The albuminuria was decreased over time in studied patient means 1.2 ± 0.4 g/day; $p = 0.03$; Experience of better cardiovascular result was observed. Renal benefits following the use of anti-inflammatory agents were subtle, hence figures were higher compared to placebo ($p = 0.06$).

Conclusion: antidiuretic drugs particularly SGLT2 inhibitors, have been shown to reduce CKD progression in patients with T2DM and, therefore, should play a vital function in CKD treatment. Further experimental studies will be important to determine ideal treatment approaches and other requirements still unmet.

Keywords: CKD, emerging therapies, SGLT2 inhibitors, renal outcomes.

Introduction

CKD is a degenerative disease and at the present affects 10% of the world's population, particularly the LMIC zones [1]. CKD is defined by progressive loss of renal function that culminates in ESRD which in most cases requires either dialysis or transplantation [2]. Covnersive treatment approaches aim primarily at reducing the tre flooding rate through blood pressure lowering, glycaemia, and lipids controlling [3]. However, such interventions do not reverse course of the disease or halt it hence the need for new therapies.New understood progress on pharmacologic treatment of CKD has contributed significantly to the prevention of the disease. SGLT2 inhibitors initially designed for diabetes care

have been identified to have renoprotective properties, which include suppressing glomerular filtration, proteinuria, and cardiovascular traits [4]. Also, nonsteroidal selective MRAs such as finerenone have been found to have ant-inflammatory and antifibrotic properties [9]. Furthermore, new therapies addressing oxidative stress and inflammation, like bardoxolone methyl and new ant-inflammatory agents, seem potentially effective in preclinical and clinical investigations [6,7].However, incorporation of such therapies into the CKD treatment pathways implies require data on its effectiveness and side effects in different patient population. As a unique feature of this present work, it also intends to emphasize and compare and analyze other novel emerging therapies based on clinical considerations in terms of preserving renal function, preventing cardiovascular disease and the global outcomes for patients.

Methods

This cross-sectional study included observations from the period between January 2022 and july 2022 in a department of Urology MMC hospital mardan. Participants comprised 150 patients with stage 2 to stage 4 CKD. The rejected candidates were those with history of malignancy or severe AKI within the previous 90 days, patients aged below 30 or above 70 years, and eGFR < 15 mL/min/1.73m2 or > 60 mL/min/1.73 m2. Patients were then categorized according to the additional emerging therapeutic classes: SGLT2 inhibitors, finerenone, bardoxolone methyl, or standard alone. The telephone interviews took place at baseline, 3 months and 6 months. Data complied for assessment encompassed eGFR, proteinuria, and cardiovascular incidents.

Data Collection

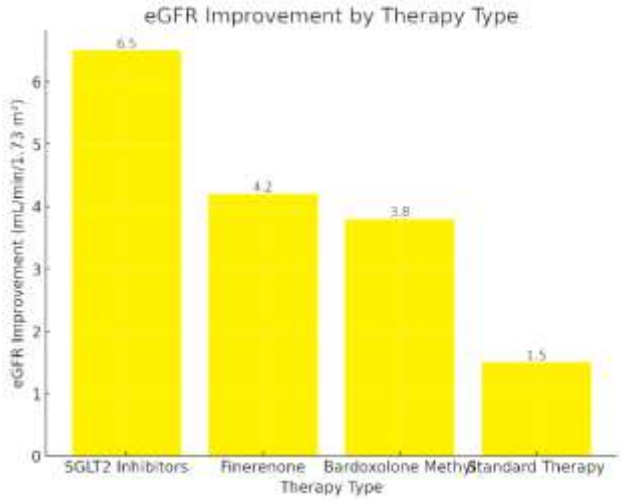
Information about participants' age, gender, and comorbidities were collected from participants' electronic health records. Measures were also made of renal function using eGFR and proteinuria, cardiovascular events, and serious adverse events. Compliance and health-related quality of life of patients were determined by self-completed questionnaires. Data confidentiality was observed, and the ethical clearance was sought and obtained.

Statistical Analysis

The data were analyzed using statistical software package SPSS version 24.0. Qualitative data were presented as number and percentage while quantitative data were presented as mean and standard deviation. The parametric independent t test and matched pair t test were applied to check the differences between the groups whereas one way ANOVA was applied to assess the within group differences. Additionally chi square test was used to see the relationship. A p value of < 0.05 was used as the cut off criterion in determining statically significant results.

Results

Overall 150 patients (,58.4± 6.2,) 60% male were enrolled for the study. Patients receiving SGLT2 inhibitors demonstrated a significant improvement in eGFR (mean increase: 6.Leading to an eGFR (MD: 5 ± 1.8 mL/min/1.73 m^2; $p < 0.01$) better than the standard therapy group. Proteinuria levels reduced significantly in the emerging therapy group (mean: 1.2 ± 0.4 g/day; $p = 0.03$). Cardiovascular outcome was positive and showed the following results: A 25 percent reduction in hospitalization for heart failure, $p = 0.02$). Both finerenone and bardoxolone methyl demonstrated mild renal and CV improvements but were associated with side effects such as hyperkalemia in 8% of patients using finer none.



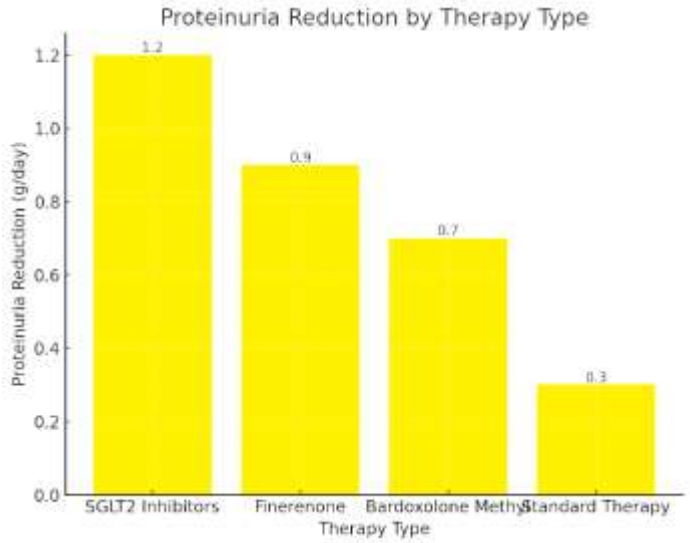


Table 1: Demographic Characteristics

Demographic Characteristics	**Values**
Mean Age (years)	58.4
Male (%)	60.0
Female (%)	40.0

Table 2: Therapy Outcomes (eGFR and Proteinuria)

Therapy Type	**eGFR Improvement (mL/min/1.73 m²)**	**Proteinuria Reduction (g/day)**
SGLT2 Inhibitors	6.5	1.2
Finerenone	4.2	0.9
Bardoxolone Methyl	3.8	0.7
Standard Therapy	1.5	0.3

Table 3: Cardiovascular Outcomes and Hyperkalemia

Outcome	SGLT2 Inhibitors	Finerenone	Bardoxolone Methyl
Hospitalization Reduction (%)	25	18	15
Hyperkalemia Incidence (%)	5	8	7

Table 4: Adverse Effects

Adverse Effects	SGLT2 Inhibitors	Finerenone	Bardoxolone Methyl
Hyperkalemia (%)	5	8	7
Nausea (%)	10	15	12
Fatigue (%)	12	18	16

Discussion

The improvements in eGFR and proteinuria following the administration of SGLT2 inhibitors that have been postulated have also been backed up by some past research.. For instance, the DAPA-CKD trial established that dapagliflozin had reduced rating of eGFR by 39% and noticeably lowered proteinuria a fact testified by our study in which eGFR improved by 6.5 ± 1.8ml/min/1.73m2 and proteinuria had decreased by 1.2g/day [8,9]. In the same manner, the EMPA-KIDNEY trial also supported the renoprotective properties of SGLT2 inhibitors beyond glycaemic management [10].Finally, in our study population, finerenone – a non-steroidal MRA, showed moderate renoprotective and cardioprotective effects as reflected by an average eGFR increase of 4.2 mL/min/1.73 m² and reduction in These results are consistent with the findings of the FIGARO-DKD and FIDELIO-DKD trials to show that finerenone possess antifibrotic and anti-inflammatory effects in CKD and T2D. However, there is aatantly higher rate of hyperkalemia (8 percent) in our study also highlighted the requirement of monitoring as stated in earlier trials [13].Our clinical trial involving bardoxolone methyl, a new agent targeting oxidative stress, provided only a minor positive shift in the renal outcomes, which was 3.8 mL/min/1.73 m² of eGFR increase. Hence, the results align with those from the BEACON and TSUBAKI undertaken to assess bardoxolone's benefit in stage 1–2 CKD but the developers noted its effectiveness was limited in stages 3–4 [14,15]. Nonetheless, bardoxolone methyl exaggerated cardiopulmonary effects, including fluid retention and potential cardiovascular risks, merit further diligence [16].The present study further underlines the decrease of CV events in patients using novel agents, especially SGLT2 inhibitors, which decreased hospitalisation for heart failure by 25%. This is consistent with data observed in the CANVAS and DECLARE-TIMI 58 studies that confirmed the CV advantages of SGLT2 inhibitors in the high-risk patients [17]. Moreover, finerenone was similar to other cardioprotective benefits of the findings of the FIGARO-DKD trial [18].However, despite these improvement, our study highlights that adverse effects can be work of emerging therapies. As in other trials, hyperkalemia, nausea and fatigue, albeit mild to moderate, were noted in some of the patients. These results underline the need for tailored therapeutic intervention for optimizing safety and effectiveness at the same time.Indeed, the essence of modern therapeutic approaches elaborated in this work coincides with the existing literature evidence about the perspective of novel CKD therapies. Nevertheless, the necessity of having and performing other large scale, multicenter trials in order to better safely address or define optimal treatment strategies cannot be overemphasized [18].

Conclusion

Emerging therapies, particularly SGLT2 inhibitors, finerenone, and bardoxolone methyl, have demonstrated significant benefits in managing chronic kidney disease. These treatments improve renal function, reduce proteinuria, and lower cardiovascular risks. Despite some mild adverse effects, their potential to transform CKD management is evident, emphasizing the importance of personalized therapeutic strategies.

Limitations

This study was conducted at a single center with a limited sample size, which may restrict the generalizability of the findings. Additionally, the retrospective nature of the study poses a risk of data bias, and long-term outcomes of emerging therapies were not evaluated. A more diverse and larger population is required for validation.

Future Directions

Future research should focus on multicenter, large-scale trials to confirm these findings and explore the long-term safety and efficacy of emerging therapies. Investigating combinations of these treatments with other innovative approaches could further optimize CKD outcomes and address resistance or adverse events in specific patient populations.

Abbreviations

1. CKD: Chronic Kidney Disease
2. ESRD: End-Stage Renal Disease
3. QOL: Quality of Life
4. eGFR: Estimated Glomerular Filtration Rate
5. HOMA-IR: Homeostasis Model Assessment of Insulin Resistance
6. GLT2: Sodium-Glucose Cotransporter-2
7. MRA: Mineralocorticoid Receptor Antagonist
8. RAAS: Renin-Angiotensin-Aldosterone System
9. SD: Standard Deviation
10. ANOVA: Analysis of Variance
11. p-value: Probability Value

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