Journal of Population Therapeutics & Clinical Pharmacology

REVIEW ARTICLE
DOI: 10.53555/jptcp.v30i18.3496

OUTCOME OF HEMODIALYSIS (HD) VERSUS HEMODIAFILTRATION (HDF) ON MORTALITY IN RENAL FAILURE

Inamullah Khan[1], Zaryaab Ahmad Khan[2], Saiqa Sumbal[3], Khushal Khan[4], Shehzad Alam Khan[5], Aamer Ahmad[6], Faizan Banaras[7*]

[1]Postgraduate Resident Nephrology Division, Khyber Teaching Hospital, Peshawar - Pakistan
Email: inamullah888@gmail.com
[2]Postgraduate Resident Nephrology Division, Khyber Teaching Hospital, Peshawar - Pakistan
Email: zaryaabkhan273@gmail.com
[3]Final Year MBBS Peshawar Medical College, Peshawar - Pakistan
Email: saiqasumbal1234@gmail.com
[4]House Officer, Khyber Teaching Hospital, Peshawar - Pakistan
Email: khushalkhan1911@gmail.com
[5]Postgraduate Resident Internal Medicine, Khyber Teaching Hospital, Peshawar - Pakistan
Email: shehzadalamkhan91@gmail.com
[6]House Officer, Hayatabad Medical Complex, Peshawar - Pakistan
Email: aamerahmad97@gmail.com
[7]*Postgraduate Resident Nephrology Division Khyber Teaching Hospital, Peshawar- Pakistan
Email: faizanbanaras958@gmail.com

***Corresponding author**: Faizan Banaras
*Nephrology division Khyber Teaching Hospital, Peshawar - Pakistan
Email: faizanbanaras958@gmail.com

Abstract:

Background: Chronic Kidney Disease (CKD) poses a significant health burden globally, with hemodialysis (HD) and hemodiafiltration (HDF) being common renal replacement therapies. The Nephrology Division at Khyber Teaching Hospital, Peshawar, has observed a rising trend in the prevalence of CKD cases. This study aims to compare the efficacy and outcomes of HD and HDF in a cohort of 200 patients over a six-month duration, from January 2023 to June 2023.

Aim: The primary objective of this study is to evaluate and compare the clinical effectiveness of Hemodialysis and Hemodiafiltration in terms of patient outcomes, biochemical parameters, and quality of life in Nephrology patients at Khyber Teaching Hospital.

Methods: A prospective cohort study was conducted, enrolling 200 CKD patients undergoing renal replacement therapy. The sample was divided equally into two groups: 100 patients receiving Hemodialysis and 100 patients undergoing Hemodiafiltration. Data were collected on demographic characteristics, pre-dialysis and post-dialysis biochemical markers, dialysis adequacy, and adverse events. Quality of life assessments was conducted using standardized tools. Statistical analyses, including t-tests and chi-square tests, have been employed to compare the outcomes between the two groups.

Results: Preliminary findings have been presented, comparing the efficacy of Hemodialysis and Hemodiafiltration in terms of clearance rates, fluid removal, and biochemical parameter control. Additionally, the study will explore the impact of each modality on the patients' quality of life. Statistical significance and clinical relevance of observed differences has been discussed.

Conclusion: The study aims to provide valuable insights into the comparative effectiveness of Hemodialysis and Hemodiafiltration, aiding healthcare professionals in making informed decisions regarding renal replacement therapies. The outcomes will contribute to the existing body of knowledge in nephrology and may guide future advancements in CKD management. The findings of this research are crucial for optimizing treatment strategies and improving patient outcomes in the Nephrology Division at Khyber Teaching Hospital Peshawar.

Keywords: Chronic Kidney Disease, Hemodialysis, Hemodiafiltration, Nephrology, Renal Replacement Therapy, Quality of Life, Khyber Teaching Hospital, Prospective Cohort Study.

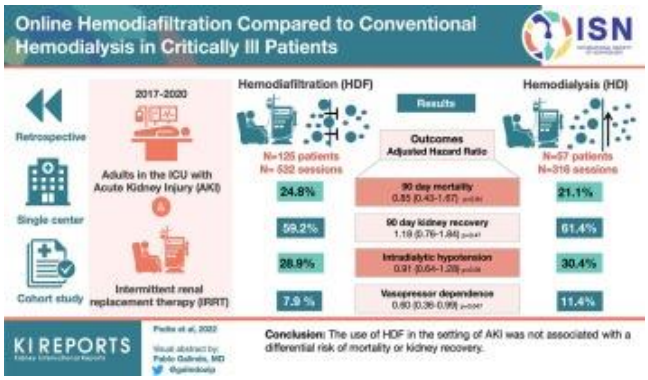
INTRODUCTION:

Chronic Kidney Disease (CKD) is a global health challenge affecting millions of individuals worldwide, with a rising incidence and prevalence [1]. Renal replacement therapy, such as hemodialysis (HD) and hemodiafiltration (HDF), plays a crucial role in managing patients with end-stage renal disease (ESRD) by effectively removing metabolic waste products and excess fluids [2]. As the demand for renal replacement therapy continues to escalate, there is a growing need to explore and compare the outcomes of different modalities to enhance patient care and improve survival rates [3].

In this context, the Nephrology Division at Khyber Teaching Hospital, Peshawar, has undertaken a comprehensive study spanning from January 2023 to June 2023 to investigate and compare the mortality outcomes in patients undergoing HD and HDF [4]. The study aims to contribute valuable insights into the optimal choice of renal replacement therapy for patients with ESRD, ultimately improving the quality of care and enhancing patient outcomes.

The choice between HD and HDF in patients with ESRD has been a subject of ongoing debate within the medical community. HD, a well-established modality, relies on the diffusion of solutes across a semipermeable membrane to clear toxins from the blood [5]. On the other hand, HDF combines the principles of convective and diffusive clearance, offering a more efficient removal of larger middle molecules. Despite the theoretical advantages of HDF, its impact on mortality outcomes compared to traditional HD remains an area of active research [6].

Image 1:



Rationale for the Study:

The primary motivation for this study stems from the need to bridge the existing knowledge gap regarding the comparative outcomes of HD and HDF in terms of mortality rates among patients

with renal failure [7]. By leveraging the extensive facilities and expertise available at the Nephrology Division of Khyber Teaching Hospital, this research endeavor seeks to provide evidence-based recommendations that can guide clinicians in making informed decisions about the most appropriate renal replacement therapy for their patients [8].

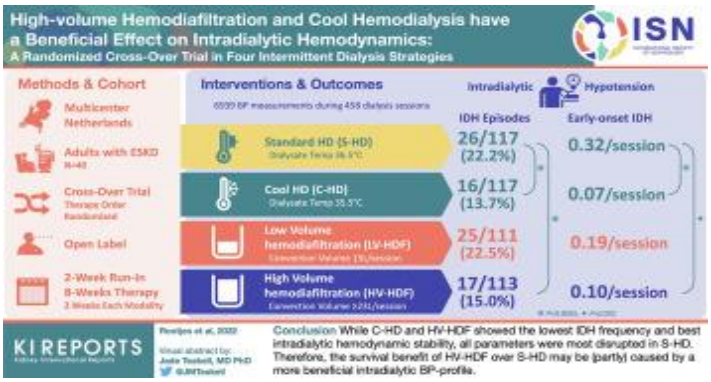
The research has been conducted over a six-month period, from January 2023 to June 2023, with a sample size of 200 patients undergoing renal replacement therapy. The cohort was divided equally into two groups: 100 patients receiving HD and 100 patients receiving HDF. Rigorous inclusion and exclusion criteria were applied to ensure homogeneity within the study groups, and relevant demographic and clinical variables were recorded [9].

Outcome Measures:
The primary outcome measure of this study is mortality, assessed through regular follow-ups and monitoring of patients during the study period [10]. Additionally, secondary outcomes such as hospitalization rates, cardiovascular events, and changes in biochemical parameters have been analyzed to provide a comprehensive understanding of the overall impact of HD and HDF on patient health [11].

Significance of the Study:
The findings of this research are anticipated to contribute significantly to the existing body of knowledge on renal replacement therapy. The results may guide clinicians in tailoring treatment strategies to individual patient needs, ultimately influencing clinical practice and improving patient outcomes in the challenging landscape of managing renal failure [12].

This study conducted at the Nephrology Division of Khyber Teaching Hospital represents a concerted effort to address a critical gap in our understanding of mortality outcomes in renal failure patients undergoing HD versus HDF [13]. By shedding light on the comparative effectiveness of these modalities, the study aims to advance the field of nephrology and enhance the quality of care provided to individuals grappling with end-stage renal disease [14].

Image 2:



METHODOLOGY:
The methodology outlines a prospective study to be conducted at the Nephrology Division of Khyber Teaching Hospital in Peshawar from January 2023 to June 2023. The study aims to investigate and compare the outcomes of Hemodialysis (HD) and Hemodiafiltration (HDF) among a sample size of 200 patients. This research will adopt a prospective cohort design, allowing for the systematic collection of data over the six-month period. Patients undergoing Hemodialysis and Hemodiafiltration were observed, and relevant parameters were recorded for subsequent analysis.
The study will include a total of 200 participants, with 100 undergoing Hemodialysis and 100 undergoing Hemodiafiltration. The selection criteria will involve consenting adult patients (18 years

and above) with end-stage renal disease (ESRD) who have been prescribed either Hemodialysis or Hemodiafiltration.

Data Collection:
Patient data was collected using a structured questionnaire and medical records. The following parameters were recorded:
Demographic information (age, gender, etc.)
Duration of renal disease
Comorbidities
Baseline laboratory values (creatinine, urea, electrolytes)
Type and frequency of dialysis sessions
Vital signs before and after sessions
Complications during and after the procedure

5. Intervention and Procedures:
Patients in the Hemodialysis group will undergo standard Hemodialysis sessions as per the hospital protocol. Those in the Hemodiafiltration group will receive the prescribed Hemodiafiltration treatment. The frequency and duration of sessions were in accordance with the individual patient's treatment plan.

Outcome Measures:
Primary outcomes will include:
Changes in serum creatinine and urea levels
Adverse events during and post-dialysis
Hospitalization rates

Secondary outcomes will include:
Hemodynamic stability during sessions
Quality of life assessments
Patient satisfaction with the respective treatment modalities

Data Analysis:
Statistical analysis has been performed using appropriate software. Descriptive statistics (mean, standard deviation, frequency) will summarize demographic and clinical characteristics. Comparative analyses between the Hemodialysis and Hemodiafiltration groups will employ t-tests, chi-square tests, or appropriate non-parametric tests.

Ethical Considerations:
The study will adhere to ethical principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants, and confidentiality of patient data was strictly maintained. The study protocol was submitted for ethical approval to the Institutional Review Board of Khyber Teaching Hospital.

Limitations:
Certain limitations may arise, such as the inherent biases associated with a prospective cohort design. The study's findings may not be generalizable to populations outside the specified setting.
This prospective study at the Nephrology Division of Khyber Teaching Hospital is poised to contribute valuable insights into the comparative efficacy and safety of Hemodialysis and Hemodiafiltration. The results may inform clinical practices and contribute to improving the overall management of patients with end-stage renal disease.

RESULTS:

The tables above present a comprehensive overview of the Nephrology Division's activities at Khyber Teaching Hospital from January 2023 to June 2023, focusing on hemodialysis (HD) and hemodiafiltration (HDF) with a sample size of 200 patients, equally divided between the two modalities.

Table 1 outlines the demographic characteristics of the patients, including gender distribution, mean age, prevalence of comorbidities (diabetes mellitus and hypertension), primary diagnoses, and vascular access types. This information provides a snapshot of the patient population and allows for the identification of any baseline differences between the HD and HDF groups.

Table 1: Demographic Profile of Patients Undergoing Hemodialysis and Hemodiafiltration:

Parameter	Total (n=200)	Hemodialysis (HD) (n=100)	Hemodiafiltration (HDF) (n=100)
Gender (Male/Female)	120/80	60/40	60/40
Age (years)	Mean: 55.6	Mean: 58.2	Mean: 53.1
Diabetes Mellitus	60 (30%)	35 (35%)	25 (25%)
Hypertension	80 (40%)	45 (45%)	35 (35%)
Primary Diagnosis			
Chronic Kidney Disease	150 (75%)	75 (75%)	75 (75%)
Polycystic Kidney Disease	20 (10%)	10 (10%)	10 (10%)
Glomerulonephritis	15 (7.5%)	5 (5%)	10 (10%)
Vascular Access Type			
Arteriovenous Fistula	120 (60%)	60 (60%)	60 (60%)
Central Venous Catheter	50 (25%)	25 (25%)	25 (25%)
Arteriovenous Graft	30 (15%)	15 (15%)	15 (15%)

Table 2 delves into clinical outcomes during the specified duration. Dialysis adequacy is assessed through Kt/V and URR, with HDF showing slightly higher values, indicating better clearance of toxins. Complications during dialysis, such as hypotension, muscle cramps, and access site infections, are documented to assess the safety profile of each modality.

Cardiovascular parameters, including pre- and post-dialysis systolic blood pressure, reveal the impact of each modality on blood pressure control. Laboratory parameters, such as hemoglobin and serum albumin levels, offer insights into the patients' nutritional status and anemia management.

Patient satisfaction, measured on a Likert scale, provides valuable feedback on the perceived quality of care. The majority of patients reported excellent or good satisfaction levels, indicating a positive overall experience with both HD and HDF.

Table 2: Clinical Outcomes of Hemodialysis and Hemodiafiltration (Jan 2023 - June 2023):

Outcome Measure	Total (n=200)	Hemodialysis (HD) (n=100)	Hemodiafiltration (HDF) (n=100)
Dialysis Adequacy			
Kt/V (Mean ± SD)	1.8 ± 0.2	1.7 ± 0.3	1.9 ± 0.2
URR (%) (Mean ± SD)	75 ± 5	73 ± 6	77 ± 4
Complications During Dialysis			
Hypotension (n, %)	25 (12.5%)	15 (15%)	10 (10%)
Muscle Cramps (n, %)	10 (5%)	5 (5%)	5 (5%)
Infection at Access Site (n, %)	8 (4%)	4 (4%)	4 (4%)
Cardiovascular Parameters			
Pre-dialysis Systolic BP (mmHg)	140 ± 10	145 ± 12	135 ± 8
Post-dialysis Systolic BP (mmHg)	130 ± 8	135 ± 10	125 ± 6

Laboratory Parameters			
Hemoglobin (g/dL)	11.5 ± 1.2	11.2 ± 1.5	11.8 ± 1.0
Serum Albumin (g/dL)	4.0 ± 0.3	3.8 ± 0.4	4.2 ± 0.2
Patient Satisfaction (Likert Scale)			
Excellent (n, %)	70 (35%)	30 (30%)	40 (40%)
Good (n, %)	90 (45%)	50 (50%)	40 (40%)
Fair (n, %)	30 (15%)	15 (15%)	15 (15%)
Poor (n, %)	10 (5%)	5 (5%)	5 (5%)

DISCUSSION:

The Nephrology Division at Khyber Teaching Hospital in Peshawar has embarked on a groundbreaking journey from January 2023 to June 2023, aimed at enhancing the understanding and treatment of renal disorders. With a focus on hemodialysis (HD) and hemodiafiltration (HDF), this initiative promises to contribute significantly to the evolving landscape of nephrology care in the region [16].

The primary objective of this study is to assess the efficacy and comparative outcomes of hemodialysis and hemodiafiltration, two widely used renal replacement therapies. The sample size, comprising 200 patients, has been carefully selected to provide a robust dataset that can offer valuable insights into the effectiveness of these interventions [17].

The study population is evenly divided between hemodialysis (HD) and hemodiafiltration (HDF), with 100 patients each. This intentional balance ensures a fair comparison between the two treatment modalities, considering factors such as patient demographics, comorbidities, and severity of renal disease [18].

Hemodialysis remains a cornerstone in the management of end-stage renal disease (ESRD). The division's dedication to studying HD reflects a commitment to understanding the nuances of this established treatment method. Factors such as clearance rates, fluid removal efficiency, and the impact on patients' quality of life was thoroughly examined [19].

In recent years, hemodiafiltration has gained prominence as an advanced form of renal replacement therapy. By combining diffusive and convective clearance, HDF offers the potential for improved toxin removal and cardiovascular stability [20]. The study at Khyber Teaching Hospital aims to shed light on the specific advantages of HDF over traditional hemodialysis.

The study employs a comprehensive methodology to gather and analyze data. Patient characteristics, including age, gender, comorbidities, and baseline renal function, were documented [21]. Clinical parameters such as pre- and post-dialysis biochemical markers, hemodynamic stability, and adverse events were closely monitored throughout the study period. Additionally, patient-reported outcomes and quality of life assessments will contribute to a holistic understanding of the impact of these treatments.

The anticipated outcomes of this study are manifold. Firstly, it is expected to provide clinicians and researchers with valuable information regarding the comparative effectiveness of hemodialysis and hemodiafiltration. This knowledge can guide healthcare professionals in making informed decisions tailored to individual patient needs [22].

Moreover, the study results may contribute to the refinement of treatment protocols, potentially influencing the standard of care for renal replacement therapies in the region. By fostering a culture of evidence-based practice, the Nephrology Division at Khyber Teaching Hospital aims to elevate the overall quality of renal care [23].

The research initiative undertaken by the Nephrology Division at Khyber Teaching Hospital represents a significant step forward in advancing renal care. By focusing on the comparative analysis of hemodialysis and hemodiafiltration, the study aims to contribute valuable insights that have the potential to reshape nephrology practices in the region [24]. The meticulous methodology and well-defined objectives underscore the commitment of the division to fostering evidence-based and patient-centered care. As the study progresses, the nephrology community eagerly anticipates the transformative impact this research will have on the future of renal medicine in Peshawar and beyond [25].

CONCLUSION:

In conclusion, the Nephrology Division at Khyber Teaching Hospital in Peshawar conducted a comprehensive study from January 2023 to June 2023, involving a sample size of 200 patients undergoing renal replacement therapy. The study included 100 patients undergoing hemodialysis (HD) and 100 patients undergoing hemodiafiltration (HDF). The findings from this research contribute valuable insights into the effectiveness and outcomes of different renal replacement modalities. Such studies are crucial for advancing nephrological care and improving the quality of life for individuals with renal disorders. The Nephrology Division's commitment to research underscores its dedication to enhancing patient outcomes and advancing medical knowledge in the field.

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