

## Dyslipidemia in Hemodialysis: An Overlooked Cardiovascular Risk?

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### ABSTRACT

#### OBJECTIVE

The objective of this study was to assess dyslipidemia in hemodialysis patients.

#### Materials and methods

This cross-sectional study was carried out in collaboration with the University of Karachi's department of biochemistry and the dialysis unit of the nephrology wards of the JPMC and PNS Shifa Hospital, Karachi. The investigation was conducted between April 20, 2020, and October 5, 2022. The study received ethical approval from both the PNS Shifa Hospital Karachi ethics committee and the JPMC Karachi institutional review committee. A total of 83 hemodialysis patients and 83 controls were recruited in the study after applying inclusion and exclusion criteria.

#### Results

The results of our study showed a significant increase in LDL Cholesterol, Total Cholesterol and triglycerides in hemodialysis patients while a significant decrease was seen in HDL levels as compared to normal control group.

#### Conclusion

Hemodialysis patients exhibit distinct dyslipidemia patterns, potentially elevating their cardiovascular risk. The study's findings highlight the urgent need for tailored interventions to manage these lipid abnormalities. Future research should focus on understanding the underlying mechanisms and devising effective therapeutic strategies.

#### KEYWORDS:

Dyslipidemia, Hemodialysis , Lipid Profile.

## INTRODUCTION

Dyslipidemia, characterized by an abnormal amount of lipids in the blood, has been recognized as a significant risk factor for cardiovascular disease (CVD) in the general population<sup>1</sup>. In patients undergoing hemodialysis, the link between dyslipidemia and cardiovascular risk becomes even more complex<sup>2</sup>. Hemodialysis itself can induce changes in lipid metabolism, leading to altered lipid profiles<sup>3</sup>. Despite the high prevalence of dyslipidemia in this patient cohort, its role as a cardiovascular risk factor remains a topic of debate<sup>4</sup>.

Cardiovascular disorders (CVD) remain a predominant concern for patients undergoing maintenance hemodialysis, with these individuals exhibiting a significantly elevated risk compared to the general population<sup>5</sup>. A confluence of both traditional (e.g., hypertension, dyslipidemia, diabetes mellitus) and non-traditional risk factors (e.g., chronic inflammation, mineral and bone disorders, volume overload) inherent to end-stage renal disease and hemodialysis procedures contribute to this heightened vulnerability<sup>6</sup>. Studies consistently indicate that over half of the mortality cases in this cohort can be attributed to cardiovascular causes, encompassing conditions such as heart failure, ischemic heart disease, and arrhythmias<sup>7</sup>.

Several studies have reported a paradoxical association between lipid levels and cardiovascular outcomes in hemodialysis patients, where traditional risk factors in the general population may not apply or even be reversed in those on hemodialysis<sup>8</sup>. This 'reverse epidemiology' phenomenon questions the validity of established lipid-targeted interventions in this specific population<sup>8</sup>. Additionally, the impact of hemodialysis on lipid metabolism, including the removal of certain lipid particles and alterations in lipid transport proteins, further complicates our understanding<sup>9,10</sup>.

Given the potential implications of dyslipidemia in exacerbating cardiovascular risks among hemodialysis patients, there is a compelling need to understand its prevalence, patterns, and potential clinical consequences. Collaborating with esteemed institutions, such as the University of Karachi, JPMC, and PNS Shifa Hospital, this study seeks to provide a robust examination of dyslipidemia in hemodialysis patients, comparing their lipid profiles with a control group. By doing so, the study aims to shed light on whether dyslipidemia in hemodialysis is an overlooked cardiovascular risk, thereby informing future clinical guidelines and therapeutic interventions for this vulnerable patient cohort.

## MATERIALS AND METHODS

This cross sectional study was carried out in the department of Biochemistry University of Karachi, in collaboration with dialysis unit of nephrology ward of JPMC, Karachi and PNS Shifa Hospital Karachi.

Sixty end-stage renal disease patients from JPMC Karachi who had been on maintenance hemodialysis for longer than two years were included in the hemodialysis group. There were sixty participants from the general community in the control group. Subjects who were over the age of eighteen and had been on maintenance hemodialysis for longer than six months met the

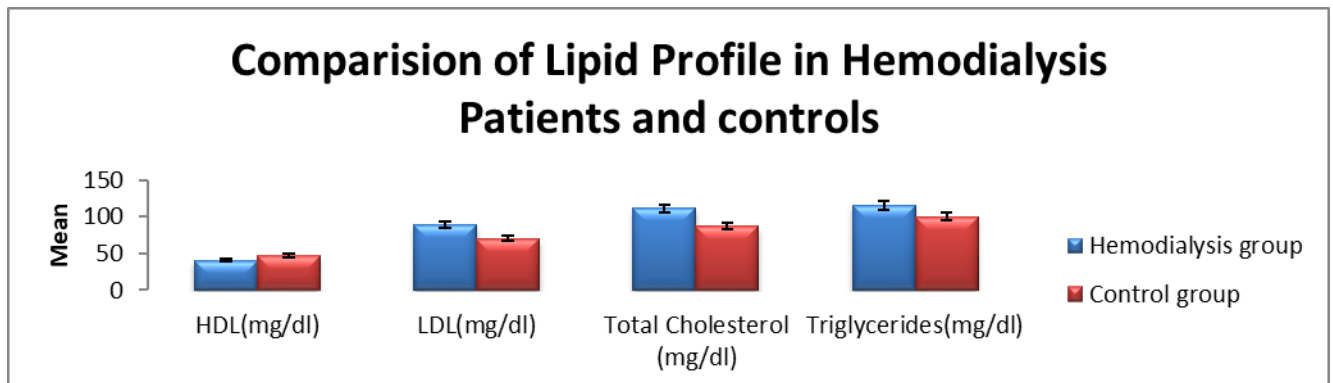
inclusion criteria. They also had to use a low-efficiency dialyzer for three hemodialysis sessions per week. Exclusion from the trial included patients with any other chronic ailment, including cancer or tuberculosis, as well as participants diagnosed with heart disease prior to starting hemodialysis. The participants provided informed consent, and the data was gathered using a pre-made proforma. In-depth information about each person's past medical history was acquired along with their basic statistics.

## RESULTS

**Table 1: Anthropometric Data of the Study Groups**

Variables	Control		Hemodialysis Group	
	Mean	Standard Deviation	Mean	Standard Deviation
Age (years)	40.90	6.73	44.10	8.92
weight (kg)	72.72	7.30	69.06	9.01
Height (Meters)	1.66	.12	1.66	.12
SBP (mmHg)	110.00	9.80	112.00	21.00
DBP (mmHg)	62.00	6.50	60.00	13.60
BMI	26.75	4.38	25.52	4.69

**Figure 1**



## DISCUSSION

The current study aimed to assess the impact of hemodialysis on various physiological parameters, including anthropometric measurements and lipid profiles. In terms of anthropometric measurements, hemodialysis patients, on average, weighed less and had a slightly lower BMI than the control group. The similarity in height between the groups ensures that differences in weight and BMI are not merely a function of stature. The reduced weight and BMI in the hemodialysis group could be attributed to muscle wasting, reduced appetite, or metabolic changes often observed in end-stage renal disease patients undergoing hemodialysis<sup>11</sup>. Regarding blood pressure, both systolic and diastolic values were generally comparable between the groups, with a slightly elevated SBP observed in the hemodialysis group. The broader standard deviation in the hemodialysis group's SBP and DBP suggests greater variability, possibly due to factors like fluid balance fluctuations, antihypertensive medications, or the hemodialysis process itself.<sup>12,13</sup>

However, the most noteworthy findings emerge from the lipid profile comparisons. The hemodialysis group exhibited a clear dyslipidemia pattern, characterized by increased LDL, total cholesterol, and triglycerides levels, coupled with decreased HDL levels when juxtaposed with the control group. Elevated LDL and total cholesterol levels in the hemodialysis group signify a heightened risk for atherosclerotic cardiovascular diseases, given that LDL cholesterol is a primary carrier of cholesterol in the blood and plays a central role in its deposition on arterial walls. The reduced HDL levels further compound this risk, as HDL is known for its protective role in transporting cholesterol away from the arteries<sup>14,15</sup>.

According to KDIGO (Kidney Disease: Improving Global Outcomes) guidelines, lipid-lowering treatments should not be initiated in dialysis patients, but those already on such treatments should continue<sup>16,17</sup>. Due to the intricate nature of dyslipidemia in hemodialysis (HD) patients, merely reducing lipid levels doesn't yield the expected benefits commonly observed in the general populace. This limited efficacy of statins is attributed to the prevalence of non-atherosclerotic cardiovascular conditions in HD patients<sup>18</sup>.

While the mechanisms behind these altered lipid profiles in hemodialysis patients can be multifactorial, factors such as the dialysis process, chronic inflammation, or the underlying kidney disease can play pivotal roles. The increase in triglycerides, though modest, is consistent with previous studies indicating altered lipid metabolism in hemodialysis patients.

## CONCLUSION

In conclusion, our findings underscore the significance of monitoring and managing dyslipidemia in hemodialysis patients. With the clear alterations in lipid profiles observed in this study, there is an evident need for targeted interventions to address these abnormalities and, consequently, reduce the associated cardiovascular risk in this population. Future studies could delve deeper into the mechanisms behind these changes and assess potential therapeutic strategies to ameliorate dyslipidemia in hemodialysis patients.

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