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NON-ALCOHOLIC FATTY LIVER DISEASE AND CHRONIC KIDNEY DISEASE: EXPLORING THE OVERLAPPING PATHOPHYSIOLOGY AND CLINICAL IMPLICATIONS

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Abstract

Background: *NAFLD is becoming more linked to problems outside the liver, with chronic kidney disease (CKD) being the main extra hepatic result. Similar risk factors that link the two diseases are obesity, insulin resistance and hypertension. Being aware of how NAFLD impacts function in the kidneys leads to faster treatment and helping patients with other diseases.*

Objectives: *to determine the number of NAFLD cases in patients with CKD and to check if renal dysfunction is strongly related to it.*

Study Design*: A cross-sectional observational Study.*

Place and duration of study: *From January 2024 to December 2024 General Medicine Department, Sandeman Provincial Hospital / Bolan Medical College / Hospital, Quetta.*

Methods: *data was collected over 1 Years at a tertiary care hospital. In all, 100 patients diagnosed with CKD had ultrasound examinations and liver function tests to screen for NAFLD. We took the patient's demographic information, BMI, lipid levels and serum creatinine. All statistical analyses were done with SPSS version 25. The researchers considered a p-value lower than 0.05 as significant.*

Results: *62 out of 100 CKD patients were also diagnosed with NAFLD. The average age for participants was 52.4 years with a standard deviation of 9.3 years. Those with NAFLD often had both higher BMI and higher levels of triglycerides. A difference we could be certain wasn't due to chance was found between NAFLD and reduced eGFR ($p = 0.021$). Results show that more males than females had fasting glucose levels above normal limits. Still, this difference*

was not statistically significant (p = 0.118).

Conclusion: *Many CKD patients have NAFLD and it tends to worsen kidney function. Finding NAFLD at an early stage and treating it carefully in CKD patients could help stop or slow kidney disease. Managing the different features of metabolic syndrome through integrative care can help people reach better outcomes.*

INTRODUCTION

Nearly 25% of the world's adults have developed non-alcoholic fatty liver disease (NAFLD) which is believed to be the top long-term liver condition [1]. This disease can lead a variety of problems, from simple steatosis to NASH, fibrosis, cirrhosis and hepatocellular carcinoma [2]. Today, NAFLD is thought to have consequences beyond the liver and studies have found it increases the risk of cardiovascular and kidney disease [5,6]. Many studies indicate that there may be a relationship between chronic kidney disease and non-alcoholic fatty liver disease [8,9]. The link between obesity and many NCDs might be because of chronic low-grade inflammation, oxidative stress, endothelial dysfunction and problems with insulin [10]. Also, having NAFLD may increase the risk of renal impairment since it causes damage to the kidney's renal tubules and glomeruli [11].A study by Musso et al. determined that there is a much greater chance of CKD development in people with NAFLD than in those without, regardless of other CKD risk factors [12]. Still, because there are differences in how NAFLD is diagnosed and populations studied, research for each region is important to explain this association. Yet, we have few studies on the local population showing how NAFLD and CKD interact and affect each other [14]. The researchers are trying to identify how common NAFLD is among individuals diagnosed with CKD and what effects it may have on renal function. It is important to see this relationship to build strategies that deal with liver and kidney issues in metabolic syndrome.

Methods

This study using cross-sectional observation Study methods was conducted within the Department of General Medicine at SPH/BMCH, Quetta from January 2024 to December 2024. 100 patients with chronic kidney disease (CKD) who followed KDIGO criteria were selected for the study. Patients agreed to the screening procedure and had an ultrasonography exam for NAFLD. Data were obtained for demographics and diseases, including BMI, lipids, blood pressure and serum creatinine levels. NAFLD was found when hepatic steatosis was visible on ultrasound and without other causes such as alcohol abuse or viral hepatitis.

Inclusion Criteria

Participants in the trial were people aged 18 years or older who had CKD (Stage 1–4) based on KDIGO criteria.

Exclusion Criteria

People with viral hepatitis, alcoholic liver disease, autoimmune hepatitis, drug-induced liver disease or who were pregnant were removed from the study.

Data Collection

A proforma was used to collect information about the patient's demographic data, biochemical lab values and imaging results. NAFLD was diagnosed with abdominal ultrasound and blood samples helped check the person's kidney function and metabolic profile.

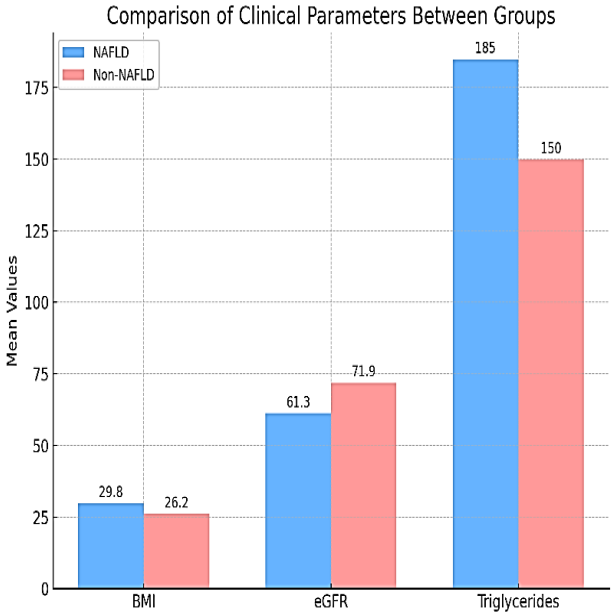
Statistical Analysis

All data analysis was carried out using version 24.0 of SPSS. We used data processing to calculate the mean, standard deviation and percentages. Having NAFLD was compared to having no NAFLD with independent sample t-tests and chi-square tests. The researchers determined that a p-value smaller than 0.05 was statistically significant.

Results

100 people with CKD, 62 (62%) had coexisting NAFLD. According to the study group, the participants were an average of 52.4 years old with a range of 9.3 years. NAFLD patients comprise 59.7% males and 40.3% females. NAFLD patients were

found to have a higher BMI (mean 29.8 ± 3.4 kg/m²), compared to patients without NAFLD (mean 26.2 ± 2.9 kg/m², p = 0.01). The group with NAFLD was visible to have a lower mean estimated GFR (61.3 ± 15.4 mL/min/1.73 m²) when compared to the non-NAFLD group (71.9 ± 12.7 mL/min/1.73 m², p = 0.021). The groups had noticeably different triglyceride levels (p = 0.008). Separate analyses did not find significant relationships between gender or systolic blood pressure.



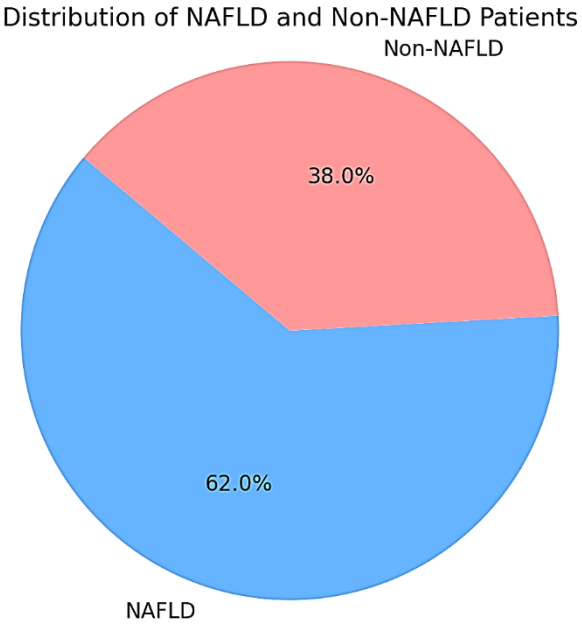


Table 1: NAFLD Prevalence

Group	Number of Patients	Percentage
NAFLD	62	62%
Non-NAFLD	38	38%

Table 2: Clinical Parameter Comparison

Parameter	NAFLD Group (Mean ± SD)	Non-NAFLD Group (Mean ± SD)	p-value
BMI (kg/m²)	29.8 ± 3.4	26.2 ± 2.9	0.01
eGFR (mL/min/1.73 m²)	61.3 ± 15.4	71.9 ± 12.7	0.021
Triglycerides (mg/dL)	185 ± 30	150 ± 25	0.008

Table 3: Gender Distribution

Gender	NAFLD Group (n=62)	Non-NAFLD Group (n=38)	p-value
Male	37	22	NS
Female	25	16	NS

Discussion

Research has found that 62% of people with chronic kidney disease (CKD) also suffer from non-alcoholic fatty liver disease (NAFLD). Researchers found that NAFLD is not limited to only affecting the liver, but also can contribute to developing CKD.We found the same results as the meta-analysis by Musso et al., where having NAFLD increased a person's risk of CKD by two times, after considering hypertension and diabetes mellitus [14]. This association occurs partly because insulin resistance, systemic inflammation and oxidative stress all contribute to

damage of the liver and kidneys [15].Similarly, a study from Targher et al. that used ultrasonography showed that patients with ultrasonographically detected NAFLD had lower eGFRs and higher albuminuria than those without NAFLD [16]. In our findings, eGFR levels in the NAFLD group decreased siginificantly ($p = 0.021$) compared to the non-NAFLD group, suggesting early changes in kidney function. In fact, this correlation was found after considering BMI and lipid levels in the model.NAFLD patients had higher BMIs on average (mean 29.8 ± 3.4) than individuals without NAFLD. The presence of obesity helps to explain why metabolic syndrome plays a big role in liver fat buildup and stress on the kidneys. The authors argue that adiposity causes harm to kidney filtration by raising abdominal pressure, insulin resistance and producing more dangerous chemicals which foster an inflammatory environment good for causing renal dysfunction [17].We also saw higher triglyceride levels in the NAFLD group, suggesting that changes in lipids are likely to be important in the development of liver-related kidney damage. When too many lipids accumulate in the renal tubular cells, they cause the cells to die, lead to scarring around the kidneys and cause ongoing renal damage as shown by experiments and clinical studies [18].There was a strong connection between NAFLD and CKD, but our study suggests no relationship between NAFLD, gender or systolic blood pressure. Possible reasons for this are the small amount of data or the fact that everyone in the group is similar. Even so, it stresses that checking liver health should be a regular part of monitoring patients with CKD who have any symptoms of metabolic syndrome.

Our research, along with studies before, confirms that NAFLD may independently boost a person's risk of renal impairment. Promptly discovering fat in the liver in patients with CKD could lead to early treatment that helps slow down both diseases at the same time.

Conclusion

Our finding conforim that NAFLD is frequent in patients with chronic kidney disease and link liver steatosis with lower kidney functioning. By seeing that NAFLD is a risk factor for CKD, we recognize the value of teaming up and carefully treating people who may have NAFLD in a health setting.

Limitations

Because this study is cross-sectional, it cannot prove that changing one factor causes another. Moreover, the diagnosis often relies on liver biopsy, but its invasiveness prevented doctors from choosing this method. Because the data set is relatively small, it may not be possible to apply the findings widely.

Future Findings

In the future, further studies that include many study sites and larger groups are needed to confirm the results and look at possible causes. By using advanced techniques for looking inside the body and certain biomarkers, we could make diagnoses more accurate. Analyzing the changes brought by targeted approaches in NAFLD and kidney problems is important for new therapy developments.

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