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A study on understanding the blood lipid profile of the hemodialysis patients in Al-Diwaniyah Province, Iraq

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ABSTRACT

One of the most frequently worldwide recorded health conditions, is a chronic renal failure (CRF), especially in elderly individuals induced due to renal damage. Kidney damage and therefore, dialysis have several detrimental effects on the body organs and their functions. According to those effects, this study was conducted to recognize the blood lipid profile of the hemodialysis patients in Al-Diwaniyah Province, Iraq. Such determination gives assurance for overall functions of the body organs in order to place proper medical management of those levels if disturbed. From Al-Diwaniyah General Teaching Hospital, Diwaniyah City, Iraq, 68 (50, 33 males and 17 females, hemodialysis CRF (H-CRF) patients and 18, 11 males and 7 females, healthy individuals) samples of blood were collected. For revealing the levels of serum blood lipids of the participants, total cholesterol (TC), triglyceride (TG), high density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C) were tested using a cholesterol oxidase method for TC and HDL-C, a glycerol kinase method for TG, and the Friedewald formula for LDL-C. The results unveiled significant ($p< 0.01$) higher TG levels in H-CRF patients than those in healthy individuals. In addition, HDL-C revealed significant ($p< 0.01$) lower levels in the H-CRF patients than those in healthy people. No significant ($p> 0.01$) data were observed from the TC and the LDL-C levels in both groups. This work demonstrates the level changes of the TGs and the HDL-C in the serum of the hemodialysis patients which need proper medical intervention for the correction of those levels.

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INTRODUCTION

Dialysis is called the waste-disposal method and additional blood water. It is a partial replacing method for renal function, particularly in cases of kidney failure. Dialysis does not conduct totally missed renal function; however, it handles its operations through ultra filtration and diffusion to a certain level. It is performed when the glomerular filtration rate (GFR) is less than 15mL/min/1.73m^2 in chronic renal failure (CRF) (Tattersall *et al.*, 2011; Lee, 2017; Vadakedath and Kandi, 2017).

CRF is a disorder in which kidney function is lost over months or years. The serum creatinine amounts, a degradation of the muscle protein item, can be identified with CRF. The GFR is indi-

cated by the levels of the creatinine, and its operations are elevated with CRF suggesting a reduced GFR. CRF is of five stages which are based on the GFR and is determined for dialysis at less-than-15ml/min/1.73m2 based GFR, referring to stage 5, end-stage renal disease (ESRD) (Patel *et al.*, 2002; Inker *et al.*, 2014).

CRF patients are dialyzed to remove toxins accumulated in the body. The oxidative stress may be caused as results to disturbances in equilibrium between the excess of toxins or reactive oxygen produced and the body lowered mechanism of defense, which overall is induced due to the occurrence of dialysis. The ordinary working of the cells is affected by oxidative stress. Earlier research has found that blood urate concentrations in CRF could be increased, further compromises the body defense system and oxidative stress increases (Liakopoulos *et al.*, 2017, 2019).

Blood flow force is termed as blood pressure (BP), which is estimated by sphygmomanometer through the blood vessel when it is pumped via the function of the heart. BP is 120/80mmHg, systolic (pumps of the heart)/diastolic (relaxation of the heart), in a healthy individual. Hypertension is regarded when it is 140/90 mm Hg. A BP increases could harm blood vessels. The concentration of toxins and liquids, which further raises blood pressure, occurs when the blood vessels of the kidneys are disrupted by the increased-BP based damages. Hypertension on its own is regarded as a renal disease risk factor and when it comes to other complications can generate CRF (Foley and Collins, 2007; Lackland and Weber, 2015; Vadakedath and Kandi, 2017).

Diabetes mellitus (DM) also is known for its responsibility of destroying blood vessels and nerves in the kidney leading to CRF end-stage that requires dialysis. DM is a CRF-causing metabolic disorder which increases the necessity for insulin administration. In people with chronic renal failure, the build-up of uremic toxins and enhancing concentrations of parathyroid hormones lead to the loss of tissue sensitivity of insulin, especially in the skeletal muscles. This is enhanced by the damage following the attachment of insulin molecules to their receptors which perturbs the metabolism of glucose and the production of glycogen (Sechi *et al.*, 2002; Baradaran, 2012; Liao *et al.*, 2012; Rafieian-Kopaie and Nasri, 2012; Hajivandi and Amiri, 2013; Rahimi *et al.*, 2013; Shahbazian and Rezaii, 2013; Tolouian and Hernandez, 2013; Einollahi *et al.*, 2014; Nasri, 2014).

According to those effects, this conducted work was established to understand the blood lipid profile of the hemodialysis patients in Al-Diwaniyah Province, Iraq. Such determination gives assurance for overall functions of the body organs in order to place proper medical management of those levels if disturbed.

MATERIALS AND METHODS

From Al-Diwaniyah General Teaching Hospital, Diwaniyah City, Iraq, 68 (50, 33 males and 17 females, hemodialysis CRF (H-CRF) patients and 18, 11 males and 7 females, healthy individuals) blood samples were collected. Categories of the current study participants such as age and time numbers of dialyses performed per amount of time are displayed in (Table 1 and Table 2, respectively).

Table 1: Age based distribution of the study participants

Age (year) /Participants	< 20	20-30	30-40	40-50	> 50
CRF patients	3	10	11	8	18
Healthy individuals	N/A	4	3	9	2

Table 2: Distribution of the study participants according to the time numbers of dialyses performed per year

Times/a year	< 1	1-5	5-10	> 10
No. of CRF patients	2	26	19	3

For measuring the serum blood profiles of the participants, total cholesterol (TC), triglyceride (TG), high density lipoprotein cholesterol (HDL-C), and low density lipoprotein cholesterol (LDL-C) were tested using a cholesterol oxidase method (Burstein *et al.*, 1970; Allain *et al.*, 1974) for TC and HDL-C, a glycerol kinase method (Mcgowan *et al.*, 1983) for TG, and the Friedewald formula (Friedewald *et al.*, 1972) for LDL-C.

RESULTS AND DISCUSSION

The results unveiled significant ($p< 0.001$) higher TG levels in H-CRF patients than those in healthy individuals. While HDL-C revealed significant ($p< 0.001$) lower levels in the H-CRF patients than those in healthy people. No significant ($p> 0.01$) data were observed from the TC and the LDL-C levels in both groups. Figure 1 shows those data changes in the

levels of serum lipids with the significant ones.

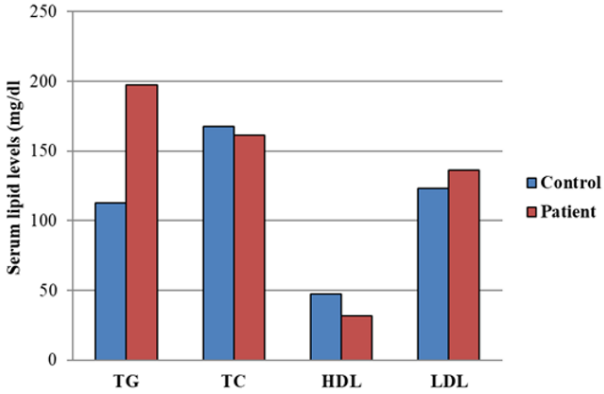

Figure 1: Lipid profiles of hemodialysis CRF patients and healthy participants. The results unveiled significant (p< 0.001)higher TG levels in H-CRF patients than those in healthy individuals. HDL-Crevealed significant (p< 0.001) lower levels in the H-CRF patients than those in healthy people. No significant (p> 0.01) data were observed from the TC and the LDL-C levels in both groups

CRF is growing globally in its incidence and prevalence. In the US, CRF incidence was about 15%, according to 1998-2004, relying on the data reported by the National Health and Nutritional Survey, or NHANES. CRF patients are the most vulnerable to coronary heart disease. In people with hemodialysis, the occurrence of cardiovascular illnesses (CVI) is huge. Roughly 50% of people with ESRD die due to CVI suggesting that CVI-related death is greater in about 30 times in dialysis people than that in people without hemodialysis. It is issued by the Kidney Dialysis Outcome Quality Initiative that for therapy to alleviate cardiovascular problems in these patients with hemodialysis with fasting TG>5.65 mmol/L, LDL>2.59 mmol/L, and cholesterol (non-HDL)>3.236 mmol/L should be taken in consideration (Foley *et al.*, 1998; Maheshwari *et al.*, 2010; National Kidney Foundation, 2002).

The present results showed significant increases in the TGs levels when compared to those levels in healthy individuals. This agrees with (Maheshwari *et al.*, 2010) who detected the lipid profiles in H-CRF patients and healthy participants (fasting for at least 12hrs) in which they found that TGs levels were elevated significantly; however, they noticed significant decreases in the levels of HDL-C in the H-CRF patients than those in the healthy individuals. Elevated LDL-C is well-known as the key indicator of the occurrence of CVIs and the main aim of lipid reduction policies for health providers, but there is proof that high TGs levels as well constitute another independent risk factor. A wide range of studies on patients with CVIs have revealed that statins based therapy decreases the rate of incidence of CVI death. However, the continued danger even after statin monotherapy, given an ideal LDL-C decrease, atherogenic dyslipidemia in some instances still induces the high risk of CVI incidence and CVI death (Sarwar *et al.*, 2007; Talayero and Sacks, 2011).

Plasma TG is obtained both from food sources and from the synthesis of de novo TGs. The food fat is easily lipolized in the digestive tract, into-micelle-dissolved, and then lastly pancreatic-lipase-hydrolyzed, thus allowing fatty acids (FAs) to be taken from the small intestine. Acyl-CoA: diacylglycerol acyltransferase 2 (DGAT2) transforms FAs into TGs when they enter the enterocytes (Mu and Høy, 2004; Twickler *et al.*, 2005; Yen *et al.*, 2008).

The current study results also demonstrated decreases in the HDL-C levels in H-CRF patients. This completely agrees with the fact that the actions of cholesteryl ester transfer protein and phospholipid transfer protein are improved by TGs increases, and can, therefore, lead to reduced HDL-C concentrations in hypertriglyceridemic circumstances (Dallinga-Thie *et al.*, 2007; Sarwar *et al.*, 2007).

CONCLUSION

This work demonstrates the level changes of the TGs and the HDL-C in the serum of the hemodialysis patients which need proper medical intervention for the correction of those levels.

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