

Original Research Article

Association between Serum Ferritin level and Non Alcoholic Fatty Liver Diseases in Khartoum Sudan

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Abstract: Non-alcoholic fatty liver disease (NAFLD) refers to the accumulation of hepatic steatosis not due to excess alcohol consumption. It is the most common liver condition in the world. The prevalence of NAFLD is up to 30% in developed countries and nearly 10% in developing nations. The aim of this study was to assess serum ferritin level among Sudanese with non-alcoholic fatty liver disease. This was a case control study conducted in Advance diagnostic center, Bahary hospital, Khartoum state, Sudan in April 2017. Participants were divided into two groups; patients with non-alcoholic fatty liver disease (N/40), and 40 normal healthy individuals as control group. Serum Ferritin will was measured by using automated enzyme immunoassay system (TOSOH). The study results revealed that there is a significant difference in serum ferritin between cases and control group ($P = 0.03$). The study also showed moderate positive correlation between ferritin and age ($R = 0.412$), ($P = 0.00$). Patients with NAFLD have higher serum ferritin level than those without fatty liver changes. Serum ferritin levels rise as grade of liver steatosis increases.

Keywords: fatty liver, hepatocellular carcinoma, Chronic liver disease, ferritin.

INTRODUCTION

Nonalcoholic fatty liver disease comprises a wide spectrum of liver damage ranging from simple, uncomplicated steatosis to steatohepatitis to advanced brosis and cirrhosis [1]. The mechanism of nonalcoholic fatty liver disease is unknown but involves the development of insulin resistance, steatosis, inflammatory cytokines, and oxidative stress. Nonalcoholic fatty liver disease is associated with physical inactivity, obesity, and metabolic syndrome [2]. NAFLD characterized by steatosis, inflammation, and considered as one of the major causes of hepatocellular carcinoma (HCC) [3]. Chronic liver disease (CLD) is the 12th leading cause of mortality in the US and is the fth leading cause of death among adults aged 44–64 years [4].

Magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) works on the same physical principle. MRI provides the anatomical information, whereas MRS provides the biochemical component. Both have an advantage over ultrasound (US) and computed tomography (CT) in that they are able to detect small changes in liver fat content. MRS

can be performed as an adjunct to whole body MRI, as part of the same examination [5].

Ferritin strongly associated with liver fibrosis that Increase it's concentration which can be valuable marker to study liver fibrosis [6]. Serum ferritin is routinely measured in patients with nonalcoholic fatty liver disease (NAFLD) as part of the laboratory work-up to rule out other causes of liver disease. Ferritin levels are often elevated in patients with NAFLD with early large series [1, 2]. The relationship of serum ferritin with severity of liver disease in NAFLD has been examined in several studies. The largest series found a significant association of ferritin levels with presence and severity of nonalcoholic steatohepatitis (NASH) and liver fibrosis [3–9]. For instance, a large Italian series [8] reported a 1.67-fold greater likelihood for advanced fibrosis in patients with NAFLD with increased serum ferritin levels; similarly, in a recent American series [9], a serum ferritin level above 1.5 times the upper limit of normal was associated with a 1.66-fold higher likelihood of having advanced fibrosis. Based on this, it has been proposed that serum ferritin levels could potentially be used to predict presence and severity of liver fibrosis in patients with NAFLD.

However, the evidence associating elevated serum ferritin with severity of liver fibrosis in NAFLD comes, at the best, from the results of multiple logistic regression analyses. Several non-invasive scoring systems used routinely in predicting the severity of liver fibrosis increases the accuracy of the scoring systems. To deal with these issues we analyzed a large database of patients with well-characterized and liver biopsy-confirmed NAFLD to determine the accuracy of serum ferritin levels in identifying presence and severity of liver fibrosis, and to determine whether the accuracy of several non-invasive scoring systems increases in identifying advanced liver fibrosis by adding serum ferritin levels.

MATERIAL AND METHODS

Study Design

This was a case control study.

Study area

The study was conducted in Khartoum state, patient enrolled in (Advance diagnostic Bahary)

Study population

40 Patients (new cases) with non-alcoholic fatty liver as case and 40 healthy individuals as control (age was matched: range from 27 to 84 years old).24 (30%) of the participants were male and 56(70%) were female.

Inclusion criteria

Patients with NAFLD.

Exclusion criteria

Patients with Liver disorders other than NAFLD, Patients with other diseases than NAFLD e.g. iron deficiency anemia, Patients use drugs contain iron

that may affect on serum ferritin level, Patients with Hypertension and Patients with DM were excluded.

Ethical consideration

Ethical approval obtained from alneelain university research committee and Informed consent was obtained from participants.

Sampling

5 ml of venous blood was collected in plain container then centrifuged for 15 minutes at 3500rpm; then serum separated.

Methods

Serum Ferritin was measured by using automated enzyme immunoassay system (TOSOH)

Quality control

The precision and accuracy of the results were checked each time by including of commercially prepared pathological and normal control sera.

Data analysis

Data was analyzed by Statistical Package of Social Science (SPSS version -23) software program mean, SD, correlations were obtained.

RESULTS

In this study we studied 80 participants 40 patients and 40 control, The current study results revealed a significant difference in ferritin between patients and control group (Table 1). Results showed a highly significant difference in the means of serum ferritin male and female of the case group (Table 2). The Pearson correlation test showed that there is moderate positive correlation between ferritin and Age (Figure 1).

Table 1: Comparison between (mean ±SD) of Ferritin level in NAFLD and control group

Variables	Case	Control	P value
Ferritin	(87.60±35.29)	(57.24±29.28)	0.003

T-test was used to calculate P value.
P value less than 0.05 considered significant.

Table 2: Mean differences of ferritin among male and female in NAFLD

Study groups	Male	Female	P value
Ferritin	(133.54±65.32)	(60.02±19.15)	0.000

T-test was used to calculate P value.
P value less than 0.05 considered significant.

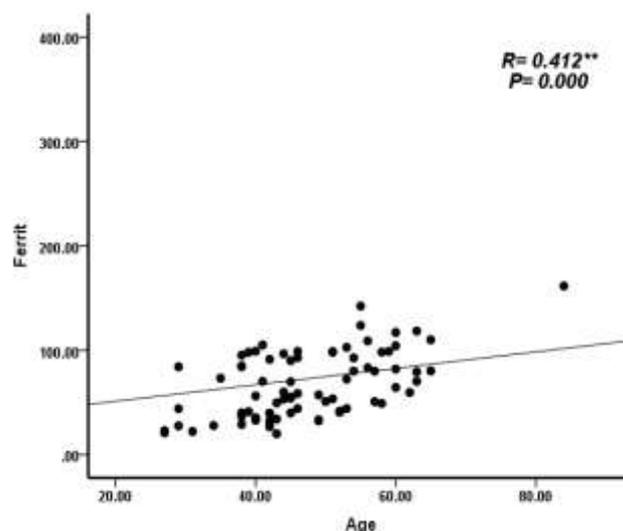


Fig-1: Correlation between age and ferritin levels among patients

DISCUSSION

In this study, we aimed to investigate the serum ferritin level among Nonalcoholic fatty liver disease (NAFLD) in Sudanese patients. The results revealed a significant increase in ferritin among case (87.60 ± 35.29) and control (57.24 ± 29.28) with P. Value = 0.003 and this may be due to hepatic inflammation, steatosis, and/or fibrosis [1, 5]. Ferritin also showed significant increase among case male (133.54 ± 65.32) compared with case female (60.02 ± 19.15) with P. Value = 0.000. Also our study results showed positive moderate correlation between age in years and serum ferritin, both significant correlation of ferritin with sex and age was agree to study done by Ueno Y, Fujita K, *et al* [10] that suggested Serum ferritin level was 108.0 ± 57.8 ng/ml in men and 26.4 ± 22.7 ng/ml in women, which showed the significant difference between the sexes. In terms of the changes in serum ferritin level by aging, serum ferritin level increased with age from twenties to fifties in the men. The low levels of serum ferritin, iron, transferrin saturation (Fe/TIBC) and hemoglobin of red blood cell were often observed in the women aged from 18 to 45, but rarely found in the women after 50 years of age. According to this fact, the low level of serum ferritin in the young women are considered to be related to the menstruation [10]. Other study conducted by Pusch HJ, *et al*; showed an increase of the serum ferritin level depending on the age. There are also sexual distinctions [11].

CONCLUSION

Patients with NAFLD have higher serum ferritin level than those without fatty liver changes. Serum ferritin levels rise as grade of liver steatosis increases

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