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Study the activity of Afamin hormone and some biochemical variables in patient with non-alcoholic fatty liver diseases in Kirkuk city

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Abstract
Nonalcoholic fatty liver disease influences 25% of the people and can keep going to cirrhosis with insufficient treatment options. Therefore, early diagnosis of nonalcoholic fatty liver disease is very important. The study aims to measure the serum concentrations of Afamin (AFM) in non-alcoholic fatty liver cases (NAFLD) and to determine their link with the stage of the disease. The study comprised (60) cases suffering from non-alcoholic fatty liver disease in Kirkuk governorate, their ages varied between (30-75), The control group comprised (30) healthy individuals who did not suffer from non-alcoholic fatty liver disease (NAFLD).The concentration of Afamin in the blood was measured, as well as some biochemical indicators were calculated such as (Alanine aminotransferase ALT, Aspartate aminotransferase AST, Alkaline transferase ALP, Gamma-glutamyl transferase GGT). The concentration of Afamin was seen to be significantly higher in cases with non-alcoholic fatty liver disease at a probability level ($p \leq 0.001$) as compared to the control group. Through these results, it was concluded that the Afamin hormone can be handled as an index of non-alcoholic fatty liver disease (NAFLD).

Keywords: Non-alcoholic, fatty liver disease, Afamin hormone

Introduction
The liver is the largest bio-multifunctional organ in the human body, located directly below the diaphragm. It produces a variety of vital functions, consisting of the production of essential proteins (Such as albumin) and the metabolism of fats and carbohydrates. Conditions that may influence the liver comprise hepatitis (inflammation of the liver), cirrhosis (scarring), fatty liver, and liver cancer (hepatocellular carcinoma) [1].

Non-alcoholic fatty liver disease (NAFLD) is the most popular chronic liver disease, with prevalence, estimate of over 25% in the general population [2, 3]. This is expressed as fat accumulation in liver cells in individuals who do not consume excessive amounts of alcohol [4]. It comprises a variety of clinical conditions, having simple steatosis (accumulation of fat in tissues) to non-alcoholic steatohepatitis (NASH) and later to cirrhosis and hepatocellular carcinoma. [5, 6]. NASH, an extremely serious modification of NAFLD with hepatocellular damage and hepatic inflammation, involves 10–30% of NAFLD cases.

NASH is combined with a high risk of progressive fibrosis and mortality [6]. In recent decades, the prevalence of NAFLD has risen mainly because of its close association with many metabolic disorders, comprising obesity, metabolic syndrome and type 2 diabetes [2, 7, 8]. Obesity is the most important factor of NAFLD. Because the risk of NAFLD increases proportionally with an increase in body mass index [2, 9], as NAFLD influences 60%-90% of obese individuals [10]. Routine blood tests provide evidence for abnormalities in the liver, for example, inflammation and hepatocyte cell death. The highly frequently investigated liver enzymes are ALT, AST, alkaline phosphatase (ALP), and gamma-glutamyl transferase (GGT) [11]. AFM has already been pointed as potential markers for NAFLD, providing a positive control [12, 13]. Afamin is a glycoprotein involves a molecular weight of 87 KDA. It was determined in 1994 and is a member of the albumin gene family, which comprises albumin and vitamin D-binding protein, whose 55% of amino acid sequences are like an albumin and which acts as a protein transporting vitamin E in plasma. Most circulating afamin is synthesized in the liver and secreted into the bloodstream. It is actively related to components of the metabolic syndrome, NAFLD [14, 15, 16].

There is a great association between serum afamin and hepatic lipid composition. Afamin positively interacts with fatty liver index and circulatory markers of hepatic function, e.g. ALT, AST, GGT [17]. The investigation of biomarkers may lead to curative benefits that could inhibit inflammation and fibrosis in the people with fatty liver disease.

Materials and Methods

This study was conducted in the departments of laboratories of Kirkuk General Hospital and the Public Health Laboratory in Kirkuk Governorate, and the study comprised (60) samples of individuals with non-alcoholic fatty liver disease, their ages ranged from (30-75) years, the number of men was (32) and the number of women (28), as well as collected (30) blood samples for healthy individuals. The number of men (15) and the number of women (15) were randomly chosen from the residents of Kirkuk governorate. Afamin hormone concentration and enzyme levels (alanine aminotransferase ALT, aspartate aminotransferases, gamma-glutamate transferase GGT, and alkaline phosphatase ALP) were considered. The serum afamin concentration was measured by applying ELISA kits.

Result and Discussion

Table (1-3) shows a significant rise in the level of Afamin hormone (AFM) in the cases with non-alcoholic fatty liver disease (NAFLD) compared to the healthy controls.

Table 1: Mean ± standard deviation of AFM hormone level in cases with nonalcoholic fatty liver disease and in healthy controls

Groups Parameter	Mean ± SD		P-Value
	Control (n = 30)	Patients (n = 60)	
Afamin (ng/l)	25.64±2.84	53.74±4.88	0.0008

The findings of this study confirm those of Timea and his colleagues (2021) [17], who observed a strong positive association between serum afamin and hepatic fat accumulation, which we also detected in our research. This is consistent with recent proteomic investigations by Malecki *et al*. (2020) [18] and Miller *et al*. (2014) [19], which started afamin to be one of many blood indicators for nonalcoholic fatty liver disease in adults and children too.

Table (2) shows a significant rise in the level of alanine aminotransferase ALT in the cases with non-alcoholic fatty liver disease compared to the healthy controls.

Table 2: Mean ± standard deviation of ALT level in cases with nonalcoholic fatty liver disease and in healthy controls.

Groups Parameter	Mean ±SD		P-Value
	Control (n = 30)	Patients (n = 60)	
ALT (IU/L)	22.96±4.62	69.91±5.70	0.00002

Table (3) shows a significant rise in the level of aspartate aminotransferase AST in the cases with non-alcoholic fatty liver disease compared to the healthy controls.

Table 3: Mean ± standard deviation of AST level in patients with nonalcoholic fatty liver disease and in healthy controls

Groups Parameter	Mean ± SD		P-Value
	Control (n = 30)	Patients (n = 60)	
AST (IU/L)	225.01±6.79	66.00±6.86	0.00008

Table (4) shows a significant rise in the level of gamma-glutamyl transferase GGT in the cases with non-alcoholic fatty liver disease compared to the healthy controls.

Table 4: Mean ± standard deviation of GGT level in cases with nonalcoholic fatty liver disease and in healthy controls

Groups Parameter	Mean ±SD		P-Value
	Control (n = 30)	Patients (n = 60)	
GGT (IU/L)	22.15±6.57	68.20±6.28	0.00009

Table (5) shows a significant rise in the level of alkaline phosphatase ALP in the cases with non-alcoholic fatty liver disease compared to the healthy controls.

Table 5: Mean ± standard deviation of ALP level in cases with nonalcoholic fatty liver disease and in healthy controls

Groups Parameter	Mean ± SD		P-Value
	Control (n = 30)	Patients (n = 60)	
ALP (IU/L)	28.43±5.08	67.65±7.64	0.00007

The results agree with the decisions of (Shen) and his colleagues (2012) [20], and (Gench *et al*.) (2013) [21], and (Cuthbertson *et al*.) (2014) [22], who identified that (ALT, AST, GGT) were significantly higher or showed a tendency toward higher levels in non-alcoholic fatty liver cases compared to healthy controls. It also agrees with the findings of (Adams *et al*.) (2005) [23], (Mofrad *et al*.) (2003) [24], and (Kunde *et al*.) (2005) [25], who observed that raised levels of (ALT and AST) express non-specific impairment to hepatocytes in NAFLD/ NASH, levels of aminotransferase may raise two to four times above the normal limit, and (ALT) is higher than (AST) unlike alcoholic hepatitis.

Clinical studies revealed that ALT levels are sensitive to the disclosure of NAFLD [26]. Another study pointed out that unexplained alanine aminotransferase (ALT) elevation is an usually utilized surrogate for the presence of NAFLD in children and adults [27]. ALT elevation has also been shown to be a predictor of NAFLD by other investigators [28]. Another recent study identified an association between higher aminotransferases and the presence of hepatic fat on imaging [29].

Body Mass Index Effect

The results in Table (6) revealed a significant rise in the levels of afamin hormone corresponding to body mass index (BMI) in the group of patients with NAFLD compared to the healthy group. This is consistent with the results of the research by Parag *et al*., where they declared a significant positive relationship between afmin levels and BMI [30].

Table 6: Levels of Afamin hormone in the sera of NAFLD cases compared to healthy group, based on BMI

Groups BMI (Kg\m^2)	Mean ±SD Afamin ng/l	
	Control	Patients
G1	26.81±3.57	51.88±5.01
G2	25.26±2.39	54.42±4.81
G3	24.93±2.53	54.42±4.74
P-Value	0.00005	

The results in Table (7) showed a significant rise in the levels of ALT based on body mass index (BMI) in the group of cases with NAFLD compared to the healthy group

Table 7: Levels of ALT in the sera of NAFLD cases compared to healthy group based on BMI

Groups BMI (Kg\m^2)	Mean ± SD ALT (IU/L)	
	Control	Patients
G1	23.09±5.03	70.64±5.04
G2	22.38±4.86	69.91±7.42
G3	23.75±4.22	69.49±5.073
P-Value	0.00008	

The results in Table (8) revealed a significant rise in the levels of AST based on body mass index (BMI) in the group of subjects with NAFLD compared to the healthy group

Table 8: Levels of AST in the sera of NAFLD patients compared to healthy group based on BMI

Groups BMI (Kg\m^2)	Mean ± SD AST (IU/L)	
	Control	Patients
G1	21.91±8.26	65.14±6.98
G2	23.97±5.57	68.38±6.26
G3	30.20±3.84	65.14±7.02
P-Value	0.00006	

The results in Table (9) showed a significant rise in the levels of GGT based on body mass index (BMI) in the group of patients with NAFLD compared to the healthy group

Table 9: Levels of GGT in the sera of NAFLD patients compared to healthy group based on BMI

Groups BMI (Kg\m^2)	Mean ±SD GGT (IU/L)	
	Control	Patients
G1	21.92±8.46	86.71±7.01
G2	20.31±6.07	67.31±7.25
G3	25.39±3.93	68.42±5.38
P-Value	0.00004	

The results in Table (10) showed a significant rise in the levels of ALP based on body mass index (BMI) in the group of patients with NAFLD compared to the healthy group

Table 10: Levels of ALP in the sera of NAFLD patients compared to healthy group based on BMI

Groups BMI (Kg\m^2)	Mean ±SD ALP (IU/L)	
	Control	Patients
G1	29.18±6.04	69.29±7.39
G2	27.26±3.83	65.28±8.38
G3	29.49±5.98	68.06±7.29
P-Value	0.00003	

These results agree with the decisions of (Miyake) and his colleagues in 2012 [31], who identified that body mass index (BMI) is a convenient factor for predicting the onset of nonalcoholic fatty liver disease (NAFLD).the excellent cut-off levels of BMI are 23 kg/m2 for men and 22.2 kg/m2 for women, as the BMI of individuals with NAFLD of the third degree was significantly higher than the first and second degree of NAFLD.

Many investigations have confirmed that physicians can take advantage of BMI to identify, early on, individuals at risk of developing NAFLD in primary care settings [32]. BMI has robustly interacted with NAFLD severity [33]; besides, GGT is the only independent predictor of fatty liver compared to other liver enzymes, such as ALT and AST [34, 35].

Conflict of Interest
Not available

Financial Support
Not available

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