



Correlation Study of Retinol Binding Protein4, Vitamin A with Liver Function Enzymes in Iraqi Fracture Patients with and without DM2

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Abstract

A fracture is a damage to bone tissue that causes damage to the tissue surrounding the bone and may penetrate the skin. Subjects and methods: the present study included (80) fractured Iraqi patients (and 40) patients with DM2 and (40) without DM2 and compared them with (40) healthy control. Patients and control are matched in age. This study showed a significant increase in retinol-binding protein 4 (RBP4) and a considerable decrease in Vit .A GPT and GOT in fracture patients with and without DM2. In addition, there was a significant negative correlation between RBP4 with (GPT and GOT) in fracture patients with DM2 and a significant positive correlation between RBP4 with (GPT and GOT) in fracture patients without DM2.

Keywords: Fracture, DM2, RBP4, Vit.A, GPT, GOT, ALP.

1. Introduction

Any bone in the body can be fractured [1]. A broken bone is a complete or partial break in the bone tissue's continuity. A significant percentage of bone fractures occur because of high force impact or stress. Type 2 diabetes is one of the most common metabolic diseases worldwide. It is caused by a combination of two essential factors: insufficient insulin synthesis by pancreatic cells and insulin-sensitive tissue failing to respond to insulin [2]. Vitamin A's significance in bone health has been thoroughly researched. Preformed retinol and provitamin A are the two types of vitamin A that may be eaten. Preformed retinol may be found in various animal-derived foods, including



dairy, liver, and eggs. Plant-based foods, such as fruits and vegetables, are high in provitamin A components such as alpha-carotene and beta-carotene.

Provitamin A can be absorbed as an intact carotenoid or oxidized to the retinal and subsequently converted to retinol in the enterocyte. Retinol that has been performed, on the other hand, is absorbed directly from the skin [3]. RBP4 is a particular transporter of retinol from the liver to the periphery, and it comes from adipose tissue in smaller amounts. High RBP4 levels have been linked to inflammation and have been linked to metabolic syndrome, cardiovascular disease, type 2 diabetes, and insulin resistance in several investigations [4]. A liver profile includes the SGOT test, which is a blood test. Serum glutamic-oxaloacetic transaminase is one of two liver enzymes that it measures. Aspartate aminotransferase (AST) is the name given to this enzyme nowadays. The amount of liver enzyme in the blood is determined by an SGOT (or AST) test [5]. The enzyme alkaline phosphatase (ALP) catalyzes the hydrolysis of phosphate esters in an alkaline environment, producing an organic radical and inorganic phosphate [6]. In healthy people, it predominantly comes from the liver, and bone iso-enzyme is a marker of bone formation that may be found (in osteoblasts) [7]. In Rheumatoid Arthritis (RA) patients, ALP may provide important information for determining fracture risk and monitoring osteoporosis [8].

Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) values are often utilized as indicators of liver damage caused by fatty acid infiltration and inflammatory stimuli [9]. The most specific sign of this liver disease is alanine aminotransferase (ALT). According to recent research, increased ALT is linked to insulin resistance, type 2 diabetes, and metabolic syndrome [10]. Hepatic insulin resistance and eventual reduction in hepatic insulin sensitivity were linked to blood ALT concentrations [11]. AST and gamma glutamyltransferase concentrations, on the other hand, were unrelated to alterations in hepatic insulin action [12].

2. Materials and methods

Blood samples were collected from (80) fracture patients of ages in the range of (22-70) years Half of the number(40) suffered from type 2 diabetes mellitus, and the other half(40) were without diabetes, and (40) were healthy in the same age and sex with patients.

All patients were enrolled at Al-Wasti teaching hospital in Baghdad during the study period from November to September 2021. Retinol binding protein 4 and vitamin A were estimated by ELASA kits (E-EL-H1581ELABSCIENCE, E-EL-0135ELABSCIENCE) in the United States and (GPT, GOT, ALP) by colorimetric method.

3. Statistical analysis

The results of this investigation were presented as mean \pm SD. A t-test was employed to compare the patient and control groups. P values of 0.05 and 0.001 were also judged significant [13].

4. Results and Discussion

The recent study in table (1) and table (2) showed the concentration of (RBP4), Vit. A GPT AND GOT as mean \pm SD in Iraqi patient fractures with DM2 (G2), without DM2 (G3), and healthy control (G1). The present study data showed a higher significant increase ($P \geq 0.001$) in G2 than in other groups. RBP4 (retinol binding protein 4) is a new adipokine that regulates insulin activity in various diseases [14]. The rise in (RBP4) might be attributed to an increase in insulin secretion to compensate for insulin resistance [15]. A metabolic disease involving retinol-binding protein (4) and type 2 diabetes is frequently associated with aberrant adipokine production [16]. RBP4 is an insulin signaling modulator; its levels are higher in those with insulin resistance or type 2 diabetes. It acts as a relay between inflammation and lipid metabolism in people transitioning from type 2 diabetes. As a result of the increased quantity of (RBP4) in fracture patients owing to inflammation, which is compounded by metabolic syndromes such as diabetes mellitus type 2 (DM2) and insulin resistance [17], table (2) also revealed a non-significant rise in (RBP4) in G2 compared to G3. Furthermore, in the circulatory system, (RBP4) is a lipocalin family member and the major transport protein of the hydrophobic molecule retinol, also known as vitamin A [18].

RBP4 activity is the most significant in the liver, which stores most of the body's vitamin A reserves as retinyl esters. Retinyl esters are hydrolyzed to retinol to mobilize vitamin A from the liver, which then binds to RBP4 in hepatocytes. So the increase in RBP4 concentration leads to a highly significant decrease in Vit. A, as shown in tables (1) and (2) in G2, then other groups. Vitamin A is a fat-soluble vitamin that humans require. It comprises retinol and its physiologically related metabolites [19]. It controls cell proliferation, differentiation, immune cell reproduction, and embryonic development [20]. A significant decrease in Vit. A might be the result of an increase in (RBP4). Tables (1) and (2) also showed the levels of liver enzymes (GPT, GOT, and ALP). There were significantly decreased concentrations in (GPT, GOT, and ALP) in G3 and G3, then G1.

The enzymes alanine amino transfers (GPT) and aspartate amino transfers (GOT) are primarily located in the liver. Still, they can also be present in red blood cells, heart cells, muscle, and other organs such as the pancreas and kidney. The levels of GPT and GOT, are essential in diagnosing liver disorders. These enzymes are broadly dispersed in bodily tissues and are employed in diagnostics [21]. GPT, GOT, and ALP levels in the blood are proportional to the extent of tissue damage [22]. ALP in the blood can be used to determine whether or not a bodily tissue, particularly the heart and liver, has been harmed. ALP (alkaline phosphatase) is a membrane-bound enzyme that hydrolyses monophosphate at a high pH and has been linked to metabolic bone disease [23]. So the levels of GPT, GOT, and ALP in serum can help people diagnose body tissues, especially the heart and liver. The levels of liver enzymes in all groups in a normal value lead to a healthy liver.

Table 1. Concentration Study of RBP4, Vitamin A, GPT, GOT, ALP IN DM2, without DM2, Healthy Control

Parameters	Mean ± SD			P value
	Control No.40	With DM2 No. 40	Without DM2 No. 40	
RBP 4 (ng/ml)	9.75 ±13.46	44.74 ± 30.17	40.38 ±30.37	0.001*
VitaminA (Mg/dl)	54.32 ± 3.78	39.07 ± 4.52	53.49 ± 5.36	0.001*
GPT (IU/L)	32.85 ± 2.27	30.44 ± 5.96	29.48 ± 5.05	0.005*
GOT (IU/L)	31.72 ± 2.50	30.54 ± 7.89	28.28 ± 6.18	0.039*
ALP (IU/L)	103.13±7.56	96.00 ±16.52	100.32 ±10.41	0.033*

*Significant

Table 2. Comparison study of some biochemical parameters between patients groups.

Parameters	Mean ± SD		P value
	With DM2 No.40	Without DM2 No.40	
RBP.4 (ng/ml)	44.74 ±30.17	40.38 ± 30.37	0.521*
VitaminA (Mg/dl)	39.07 ± 4.52	53.49 ± 5.36	0.001*
GPT (IU/L)	30.44 ± 5.96	29.48 ± 5.05	0.438*
GOT (IU/L)	30.54 ± 7.89	28.28 ± 6.18	0.348*
ALP (IU/L)	96.00 ±16.52	100.32 ±10.41	0.167*

Table 3.Correlation between RBP4 with Vit.A and liver enzymes in G2

	Vit.A	GPT	GOT	ALP
RBP4	r =0.006	r =-0.312	r =-0.036	r = 0.327
	P = 0.68	P = 0.05*	P = 0.02*	P = 0.039*

Table 4. Correlation between PRB4 with Vit.A and liver enzymes in G3

	Vit.A	GPT	GOT	ALP
RBP4	r = 0.149	r = 0.563	r = 0.592	r = -0.712
	P= 0.35	P = 0.001*	P = 0.001*	P = 0.005*

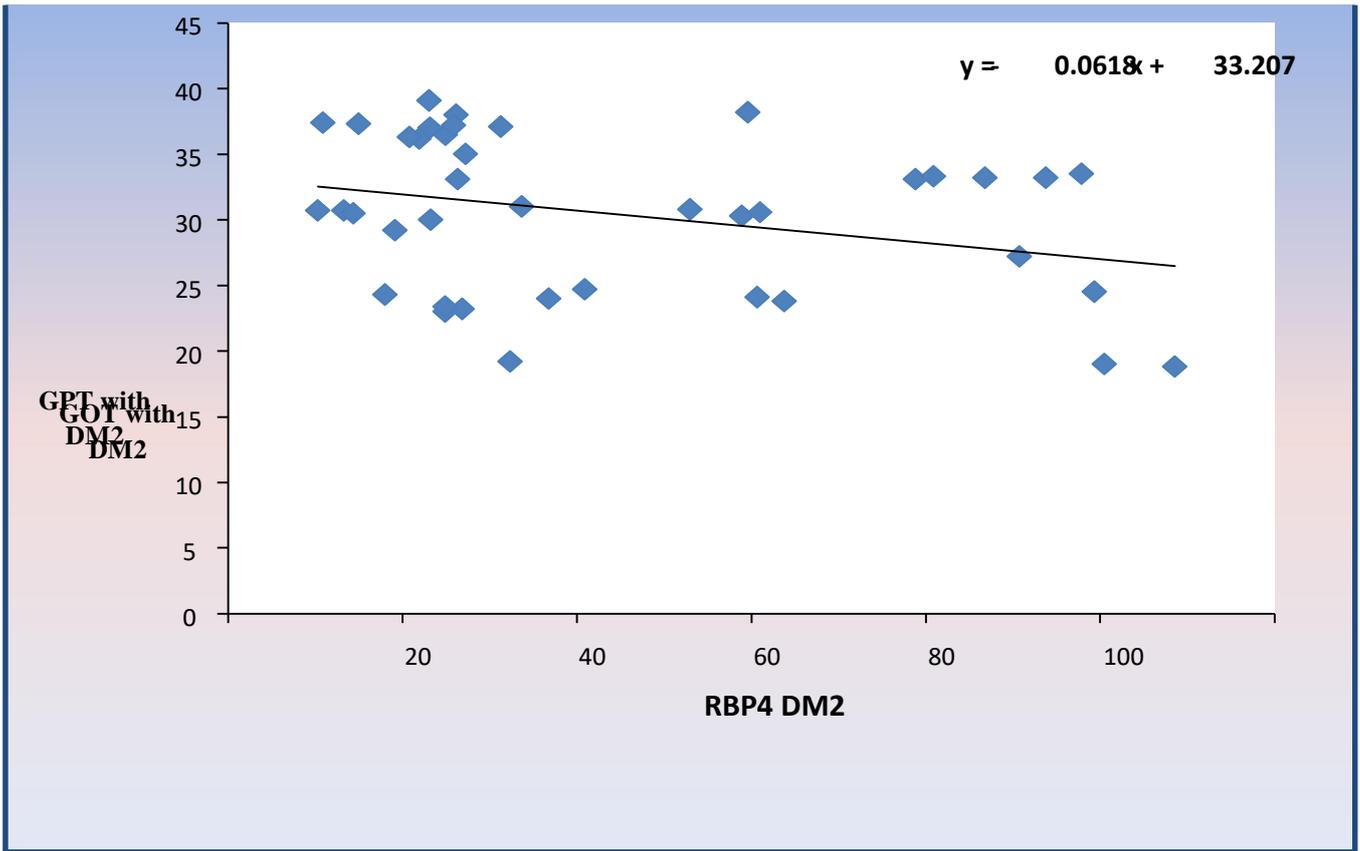


Figure 1 .Correlation between RBP with DM2 and GPT with DM 2 with DM2

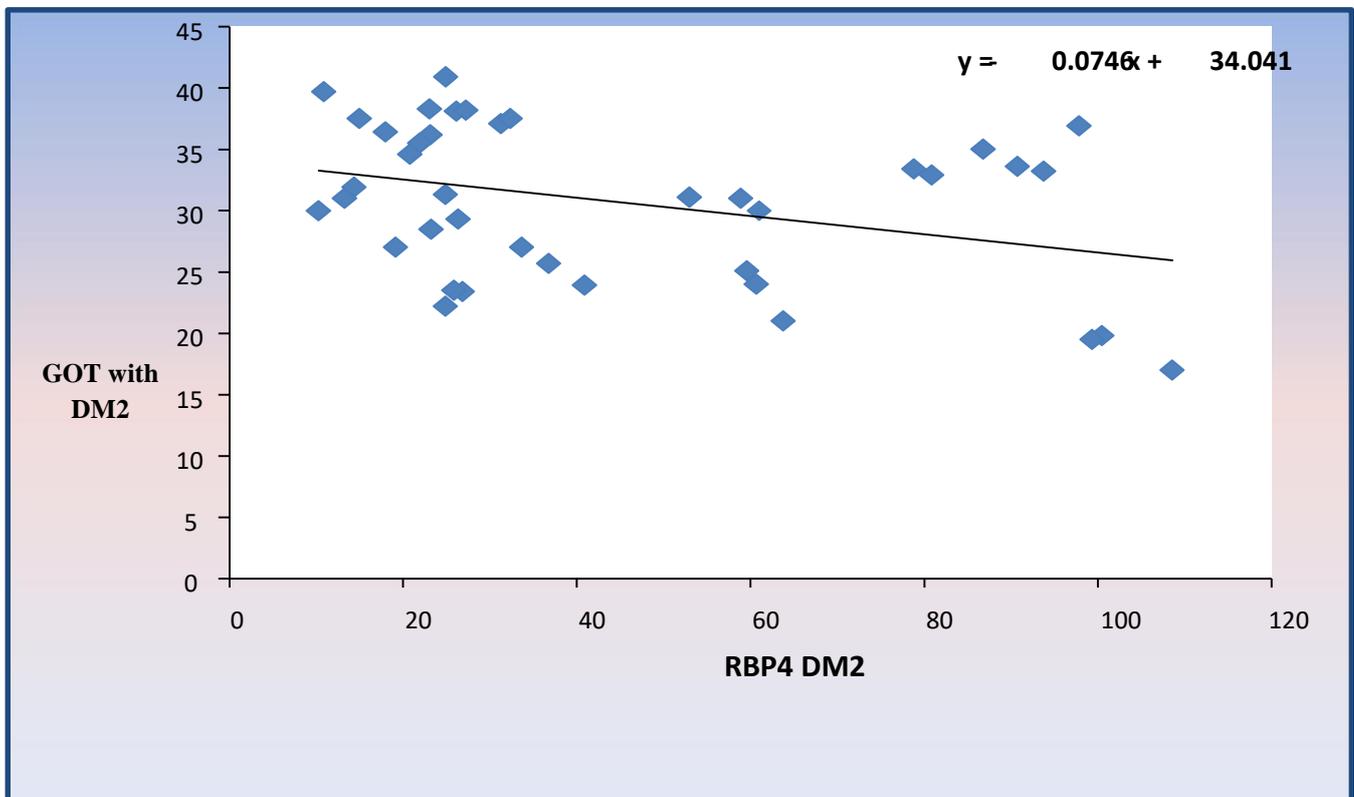


Figure 2. Correlation between RBP4 with DM 2 and GOT with DM 2

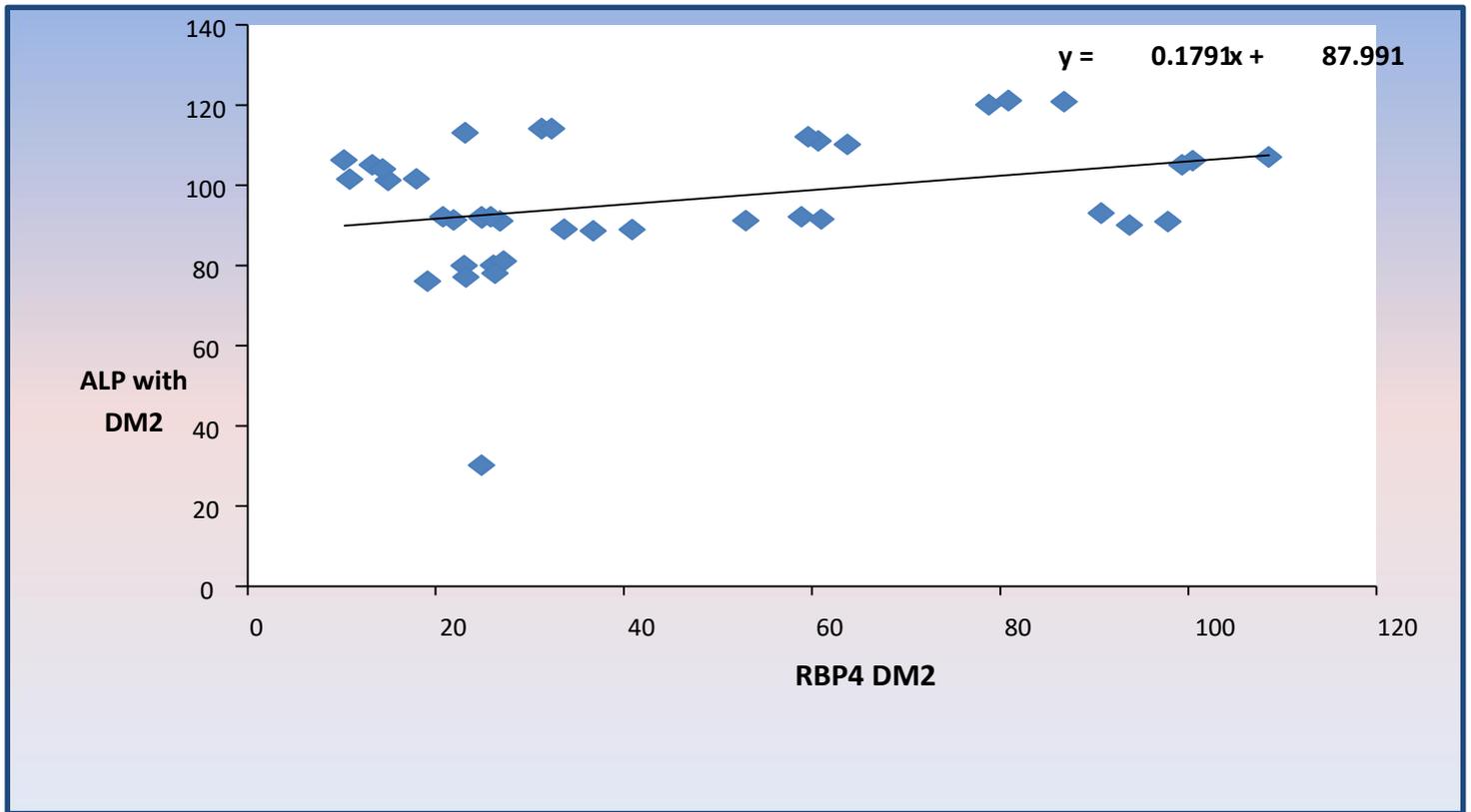


Figure 3. Correlation between RBP4 with DM2 and ALP with DM2

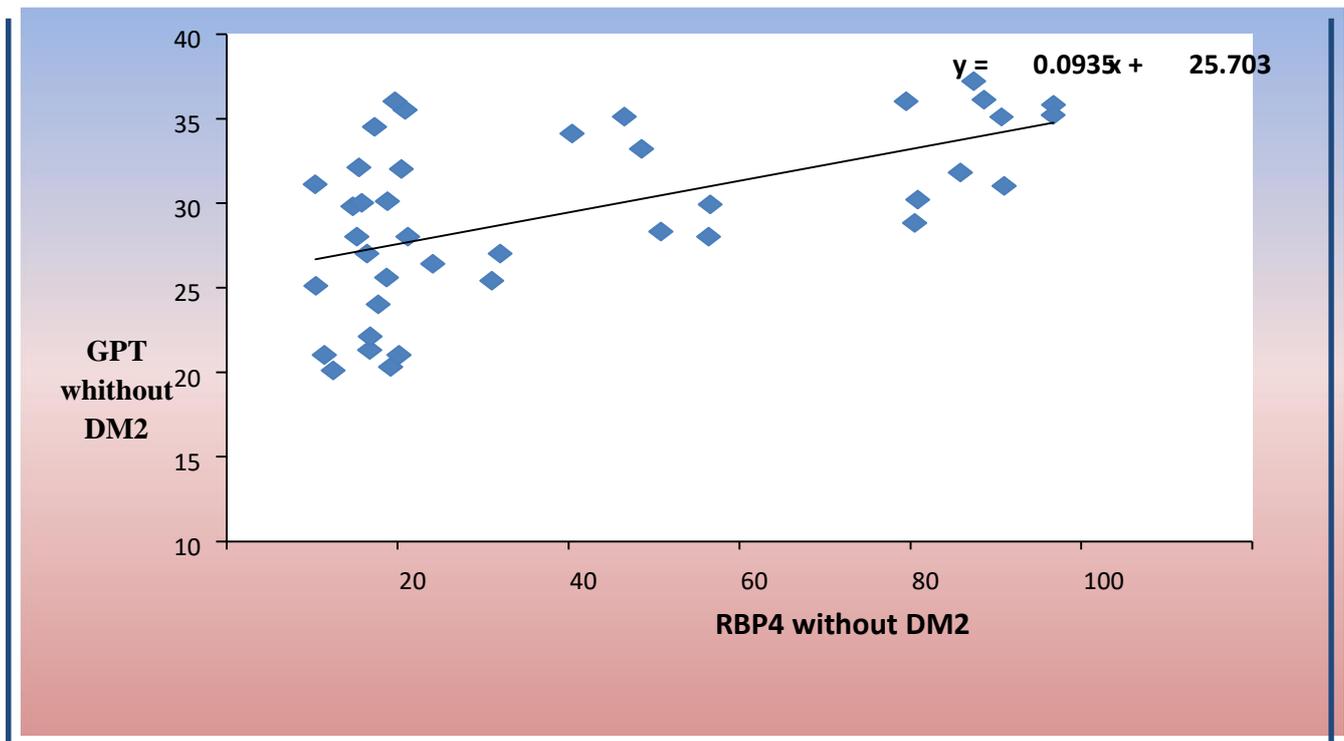


Figure 4. Correlation between RBP without DM2 and GPT without DM2

without DM2

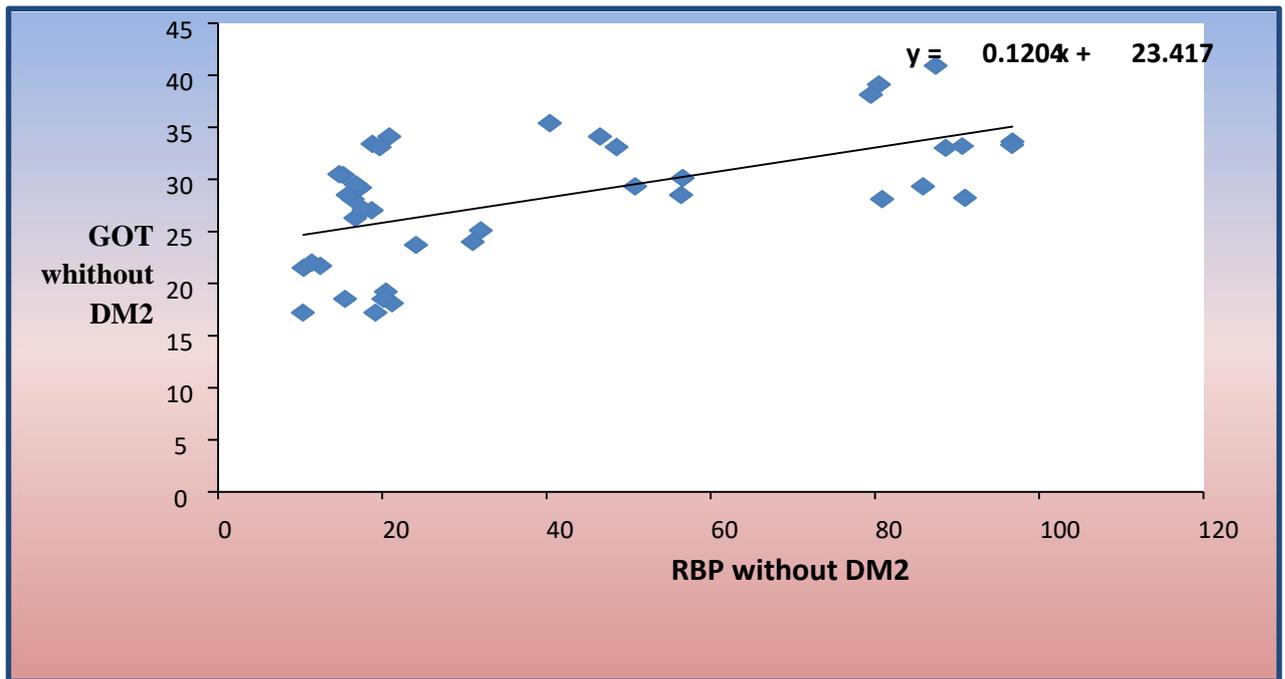


Figure 5. Correlation between RBP4 without DM2 and GOT without DM2

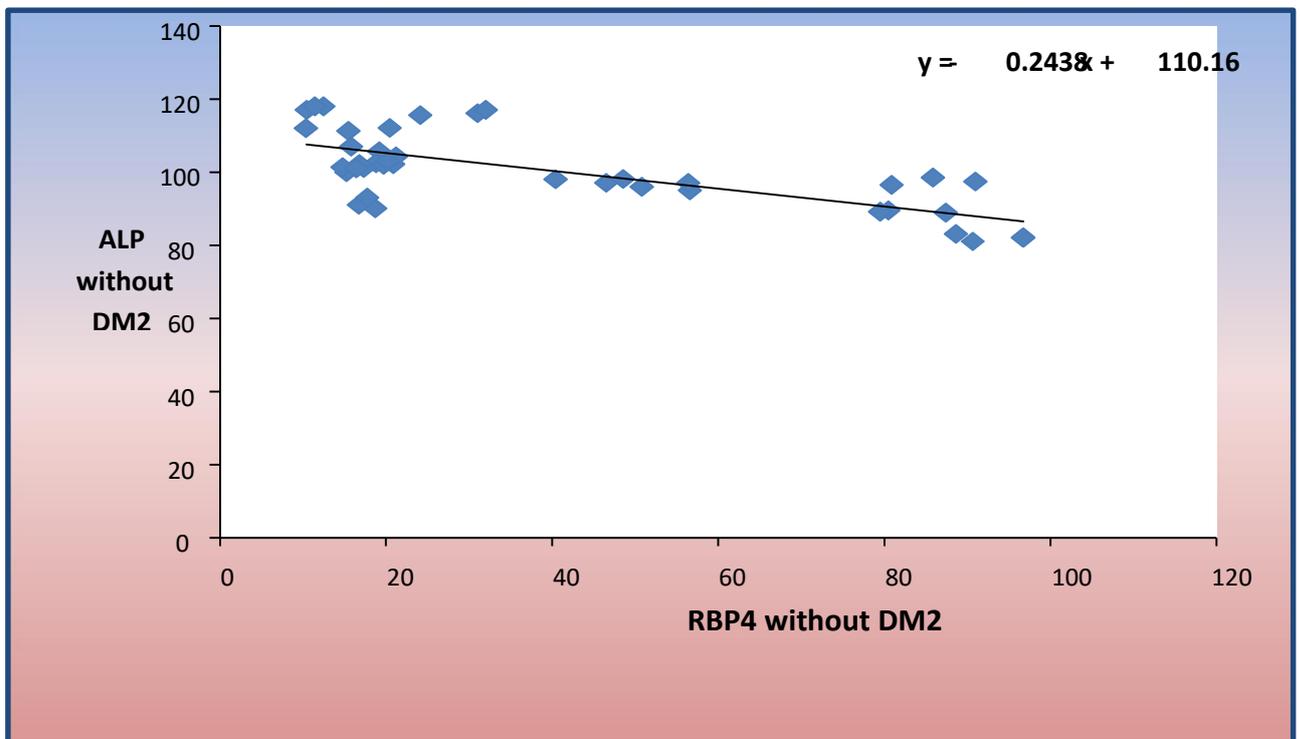


Figure 6. Correlation between RBP4 without DM2 and ALP without DM2

5. Conclusion

This study concludes that retinol binding protein 4 has a good parameter for detecting the evolution of fracture.

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