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Compression study of Irisin, Vitamin D and Kidney Function Parameters Between Iraqi Fracture Patients with and Without DM2 and Healthy Control

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ABSTRACT

Irisin is a novel myokine reported to have beneficial effects on glucose and lipid metabolism. V.D deficiency has been implicated in the development of diabetes and fracture complication.

Methods: Eighty (80) fracture patients, 40 fracture Iraqi with DM2 as (G2), (40)fracture without DM2 as (G3) and(40) healthy control (G1) matching in sex and ages . irisin, V.D, urea and creatinine were estimated in this study

Result: There were a high significant increasing level in irisin in Iraqi fracture patients with and without DM2 and a high significant decreasing in V.D and creatinine in those patients G2 and G3.

In conclusion we show that irisin and V.D had a good control of blood glucose levels helps progression of fracture and fracture with DM2 to complication and monitor of urea and creatinine for known about liver health.

Key words: Fracture, DM2, irisin, VD, Urea, Creatinine

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INTRODUCTION

A bone fracture occurs when the continuity of bone tissue is broken completely or partially. Any bone in the body is susceptible to fractures [1]. T2DM is one of the most prevalent metabolic illnesses in the world, and it is caused by a combination of two basic factors: inadequate insulin production by pancreatic -cells and the failure of insulin-sensitive tissues to respond to insulin. [2]. Diabetes mellitus is a chronic metabolic condition marked by high blood glucose levels, which causes damage to the heart, vasculature, eyes, kidneys, and nerves over time [3,4]. Irisin is a portion of the fibronectin type III domain-containing protein 5 (FNDC5/FRCP2/PeP) cell membrane protein [5]. There are 209 amino acid (aa) residues in the FNDC5 protein. It has 29 amino acids in the N-terminal signal sequence, 94 amino acids in the fibronectin type III domain, 28 amino acids in an undetermined region, 19 amino acids in a transmembrane domain, and 39 amino acids in the C-terminal section [6,7].

Vitamin D (Calciferol) is a fat-soluble steroid that regulates a variety of essential processes in the human body, including immunity, calcium homeostasis, cell differentiation, and proliferation [8,9]. A proper quantity of this vitamin, which plays different functions in human health, has a good influence on all chronic illnesses such as cancer, infectious diseases, autoimmune disorders, cardiovascular diseases, and even diabetes [10,11].

The quantity of urea nitrogen in the blood is measured by a blood urea nitrogen (BUN) test. The amount of urea nitrogen in the blood is one indicator of how well the kidneys are operating. This is a straightforward test that involves collecting blood from the body through a vein in the arm [12]. Blood urea nitrogen (BUN) is a simple but significant measure that reflects renal function when combined with serum creatinine. It has also been demonstrated to be a predictive factor for mortality in a variety of disorders [13,14]. Creatinine is a waste product produced by the body's muscles as a result of natural wear and tear. The amount of creatinine in your blood varies based on your age and body size. A creatinine level of more than 1.2 in women and more than 1.4 in males might indicate that the kidneys aren't functioning correctly. The level of creatinine in the blood grows as renal disease worsens [15]. Because creatinine is formed in skeletal muscle cells, it is influenced not only by renal function but also by skeletal muscle mass in the blood [16].

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) suffer from type 2 diabetes mellitus and the other half (40) without diabetes and(40) healthy. All patients were enrolled al-wasti teaching hospital in Baghdad, during the study period from November to December 2021.

Irisin and vitamin D were estimated by ELASA kits (Catalog No E-EL-H6120ELABSCIENCE, E-EL-0014ELABSCIENCE) Germany and (Urea, Creatinine) by colorimetric method.

Statistical analysis

The t data present study was expressed as mean ± SD in addition t- test was used for comparison study between patients and control groups. Also, p value ≤ 0.05,0.001 were considered significant [17].

RESULTS AND DISCUSSION

Tables 1 and 2 showed the level concentration of Irisin, V.D, Creatinine and Urea in serum of Iraqi fractures With and Without DM2 and healthy Control.

The present data showed a high significant increasing level in Irisin in G3 fracture patients Without DM2 than other groups.

Skeletal muscles function as an endocrine organ, producing signaling proteins called myokines that are important in moderating many of the metabolic benefits of exercise [18]. Because of their ability to improve lipolysis and glucose uptake, myokines have been shown to play an important role in preventing the development of metabolic disorders (DM2 and Fracture). One of myokines, irisin, has been shown to stimulate the browning of white adipose tissues [19]. Exercise promotes the expression of protein fibronictin type 111 domain by increasing the synthesis of peroxisome proliferator activated receptor –V (PPAR-) coactivator 1-(PGC-1). Continuation 5 (FNDCS) [20]. Irisin's forerunner. Irisin is produced when FNDCS is cleaved. Irisin causes the production of uncoupling protein 1 (UCP1) in adipose tissue, causing white adipocytes to transform into brown adipocytes [21]. The conversion of white to brown fat boosts energy expenditure and thermogenesis, which can help people with insulin resistance. Increased levels of irisin have a key role in the pathophysiology of metabolic diseases and disorders such as fracture and diabetes mellitus type 2 (DM2) [22]. Usually, irisin levels showed decreasing in DM but in these patients due to fractures in addition to DM2 have been showed an increasing level and its opposits to vitamin D which is appears in a high significant decreasing in fracture patients with and without DM2 as a compared with healthy control as shown in Tables 1 and Table 2. Vitamin D, also known as cholecalciferol, is a fat-soluble vitamin that plays a key role in calcium metabolism and bone health. Insulin secretion and synthesis have been shown to be reduced in hypovitaminosis D [23].

Vitamin D has been shown to influence muscle tissue development and function, as well as improve glucose metabolism [24]. Vitamin D receptor and (PGC-1) were attracted, and this vitamin activated irisin in muscle [25,26]. Irisin and vitamin D are both important regulators of muscle skeletal system and energy homeostasis, and it was hypothesized that a vitamin D deficient diet would lower serum irisin concentrations. However, these people who take V.D as a supplement or eat it in their diet have higher amounts of irisin in their blood [27]. Also, Table 1 and Table 2 showed a high significant decreased levels concentration of creatinine. levels of urea in G3 fracture patients. In without DM2 than another group high significant increased.

Also, Table 1 and Table 2 showed a high significant decreased levels of creatinine and a high increased level in urea in G3 iraqi fracture without DM2 group as a compared with another group (G1and G2). The majority of creatinphosphate is found in skeletal muscle, hence serum creatinine is predominantly a metabolic product of creatinphosphate. Plasma creatinine concentration is a steady direct representation of skeletal muscle mass

Table 1: Concentration study of Irisin, vitamin D, urea, creatinine in DM, without DM, and healthy control.

Parameters	Mean ± SD			P-Value
	Control No.40	With DM2 No.40	Without DM 2 No.40	
Irisin(ng/ml)	69.97 ± 13.46	183.32 ± 10.4.27	348.95 ± 10.8.55	0.001
Vitamin D (ng/ml)	33.55 ± 2.19	21.45 ± 3.58	32.56 ± 3.73	0.001
Urea(mmol/L)	3.61 ± 0.86	3.52 ± 0.53	4.98 ± 0.88	0.001
Creatinine(µmol/L)	69.98 ± 4.35	67.00 ± 8.90	56.55 ± 13.70	0.001
Significance=*				

Table 2: Compression study of some biochemical parameters between patients' groups.

Parameters	Mean ± SD		P-Value
	With DM2 No.40	Without DM 2 No.40	
Irisin(ng/ml)	183.32 ± 104.27	348.95 ± 108.55	0.001
Vitamin D (ng/ml)	21.45 ± 3.58	32.56 ± 3.73	0.001
Urea(mmol/L)	3.52 ± 0.53	4.98 ± 0.88	0.001
Creatinine(µmol/L)	67.00 ± 8.90	56.55 ± 13.70	0.001

Table 3: Correlation between irisin with V.D and kidney function in G2.

	V.D	Urea	Creatinine
irisin	R 0.364*	R -0.158	R 0.113
	P 0.021	P 0.330	P 0.489

Table 4: Correlation between irisin with V.D and creatinine, urea kidney function in G3.

	V.D	Urea	Creatinine
irisin	R-0.513**	R 0.223	R -0.215
	P 0.001	P 0.167	P 0.183

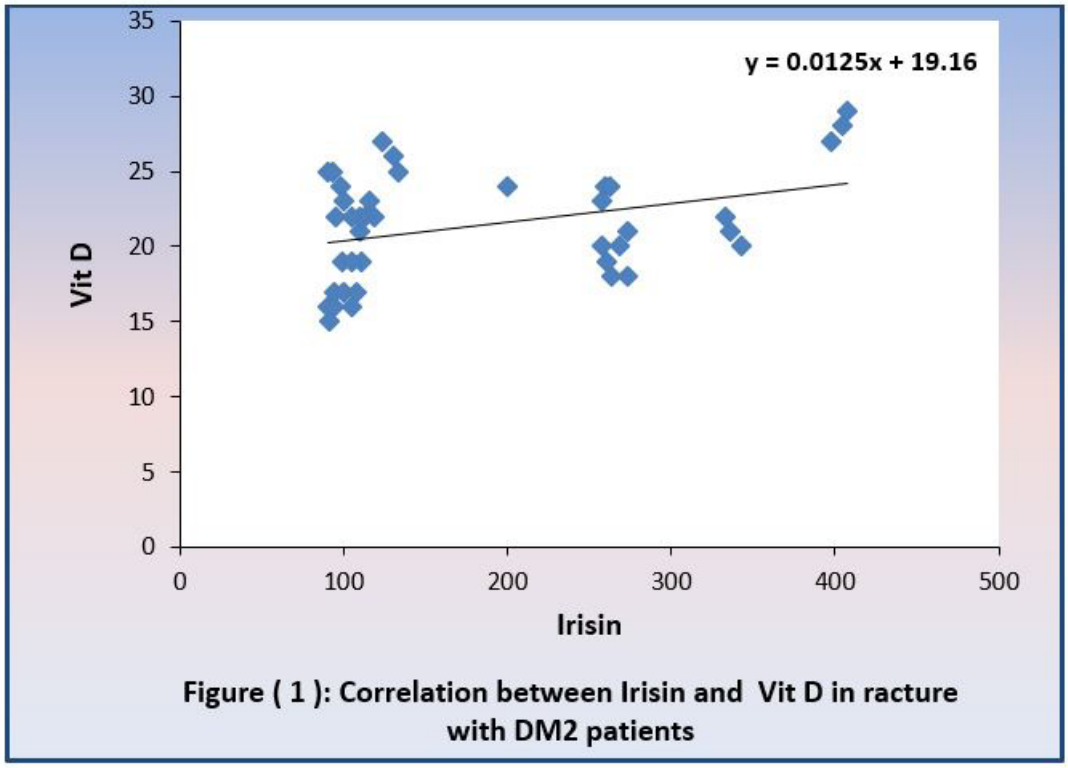

Figure 1: Correlation between Irisin and Vit D in fracture with DM2 patients.

because both the quantity of creatinine per unit of skeletal muscle mass and the rate of creatine breakdown remains constant [28]. Serum creatinine could be a good and easy-to-measure surrogate marker for muscle mass. Insulin's main target tissue is skeletal muscle [29]. Weaker blood creatinine (which reflects lower skeletal muscle) has been linked to metabolic disorders including insulin resistance and type 2 diabetes, according to several studies [30,31]. Lower levels of creatinine may also be linked to a decline in BMD (blood mass density), particularly in those who do not have renal insufficiency Furthermore, a low level of creatinine may reveal information regarding a patient's bone and muscle health in those people [32].

The nitrogen end product of protein and amino acid metabolism is blood urea nitrogen [33]. The most well accepted and most used test measures -to determine renal function are serum urea and creatine [28,34]. The assessed urea levels might be attributable to a blood borne illness [35]. The increasing levels of urea was in a normal value and these increasing not reflecting in kidney damage because in a normal amount excessing.

Tables 3 and Table 4 showed correlation study of irisin with V.D urea and creatinine in Iraqi patients with and without DM2.G2 and G3 respectively.

Table 3 the correlation between irisin and (V.D, urea and creatinine) recent study in Table 3 showed a high significant positive correlation (+re) between irisin and vitamin A as shown in Figure 1 while there was a no significant negative correlation (-re)with urea and non-significant positive (+re) correlation with creatinine in fracture patients with DM2 (G2). While Table 4 shown a non-significant positive correlation (+re) between irisin and (V.A, urea) and negative correlation (-re) with creatinine in Iraqi patients with fracture (G3).

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