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Physio-immunological study of serum Fibulin-1 in relation with hyperthyroidism

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Abstract---This study was conducted on randomly selected 60 hyperthyroidism patients (23 Males and 27 Females) attending the thyroid center in Al-Sadder Teaching City in Al-Najaf province, Iraq and a group of 30 apparently healthy subjects (15 Males and 15 Females) were included as a control group. The study was carried out from December 2021 to June 2022. The age of patients and control groups were ranged of 20-60y. The results show significant increase ($P < 0.05$) in Fibulin-1 level in patients compared with control groups. The results revealed that Fibulin-1 level are not significant in difference ($p > 0.05$) in patients and control groups at different ages. The results also revealed that there is a highly significant increase ($p \leq 0.05$) of Fibulin-1 level in both males and females in patients in comparing with control groups. The results also show that Fibulin-1 level show a significant increase ($P \leq 0.05$) in patients in all groups normal weight, over weight and obese weight in comparing with control groups. The results have shown that there is a significant negative correlation ($P \leq 0.05$) between Fibulin-1 and T3 levels and there is a significant positive correlation ($P \leq 0.05$) between Fibulin-1 and T4 levels and there is a significant positive correlation ($P \leq 0.05$) between Fibulin-1 and TSH levels in hyperthyroidism patients. The present study concluded that Fibulin-1 level was a marker for detection and diagnosis of hyperthyroidism.

Keywords---physio-immunological, serum, Fibulin-1, hyperthyroidism.

Introduction

Hyperthyroidism is a common physiological disorder, affecting about 2 percent of women and 0.2 percent of men (Franklyn, 1994). Hyperthyroidism is the condition where the thyroid gland secretes high amounts of thyroxine hormone while there is a low level of thyroid stimulating hormone in blood (Nygaard, 2008). High thyroxine hormone in its turn promotes hypermetabolic state (LiVolsi and Baloch, 2018). Hyperthyroidism is mainly caused by Graves' disease. Assays of Thyroid stimulating hormone, T4 and T3 are performed to diagnose the disorder. But to have more accurate result for the diagnosis of the disorder's cause, radioactive iodine uptake (RAIU) test is recommended (Pooria et al, 2021).

Plasma fibulin-1 is a glycoprotein secreted into the extracellular matrix, it plays a role in cell adhesion and migration along protein fibers within the extracellular matrix (ECM). Could be important for certain developmental processes and contribute to the supramolecular organization of ECM architecture, in particular to those of basement membranes. Has been implicated in a role in cellular transformation and tumor invasion, it appears to be a tumor suppressor. May play a role in haemostasis and thrombosis owing to its ability to bind fibrinogen and incorporate into clots (Hedayati, M., et al. 2020).

Materials and Methods

The study was conducted on randomly selected 60 hyperthyroidism patients (23 Males and 27 Females) and a group of 30 apparently control subjects (15 Males and 15 Females) were included as a healthy group. Hyperthyroidism was diagnosed by consultant doctors. The information of patients was obtained through a questionnaire consisted of the name, age, sex, height, weight. Patients with heart diseases, renal dysfunction, who were on drugs affect oxidative stress, i.e.: antihyperlipidemic agents, antioxidants were excluded from the current investigation. Using a disposable needle and plastic syringes five milliliters of venous blood samples were drawn from each patient and control subject. For clotting, blood was left at room temperature for 10 minutes, centrifuged 6000 rpm for 10 minutes, and then serum was separated and transported into new disposable tubes. Fibulin-1 ELISA Kit for quantitative determination of fibulin-1 in human serum, was supplied by MyBioSource, Inc. This assay for detecting fibulin-1 protein based on the principle of Competitive Enzyme Immunoassay.

Results

The results in figure (1) show a significant increase ($P \leq 0.05$) in Fibulin-1 level in hyperthyroidism patients (9.6313 ± 0.212 ng/ml) in comparing with control groups (5.4899 ± 0.171 ng/ml).

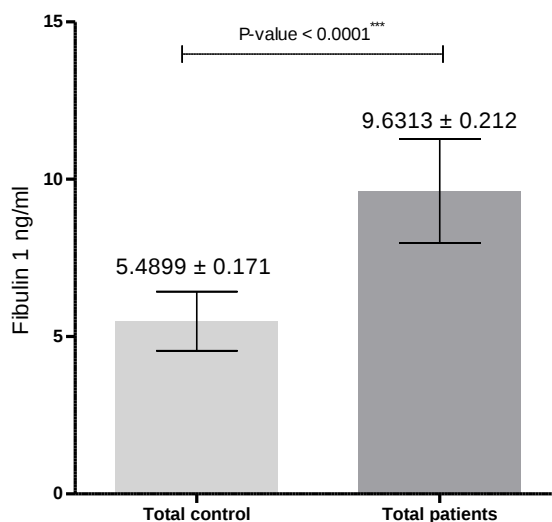


Figure 1. Fibulin-1 level (ng/ml) in hyperthyroidism patients and control groups

The results of table (1) show that there is no significant difference ($p > 0.05$) in serum Fibulin-1 levels in patients at different ages, while serum Fibulin-1 levels is highly significant increase ($p \leq 0.05$) in patients at different ages in comparing with control groups.

Table 1
Biomarkers levels of patients and control groups in different ages

Age group /year	Fibulin1(ng/ml)	
	Mean± SD	
	Control	patients
20-30	5.369 ± 0.232 a	9.582 ± 0.414 b
31-40	6.052 ± 0.2415 a	9.523 ± 0.3485 b
41-50	4.837 ± 0.3950 a	9.744 ± 0.3384 b

The results of table (2) show that there is no significant difference ($p > 0.05$) in serum Fibulin-1 levels in patient groups according to gender, while serum Fibulin-1 level is on highly significant increase ($p \leq 0.05$) in both males and females in patients in comparing with control groups.

Table 2
Fibulin-1 levels in both genders of patients and control groups

Marker	Male	Mean±SD	P-value	Female	Mean±SD	P-value
Fibulin1 (ng/ml)	Control	5.5532 ± 0.243	0.003**	Control	5.426 ± 0.2502	0.003***
	Patients	9.611 ± 0.3760 ^s		Patients	9.6438 ± 0.258 ^s	

The figures (2), (3), (4) show a significant increase ($P \leq 0.05$) in Fibulin-1 level in patients in all groups normal weight, over weight and obese weight in comparing with control groups.

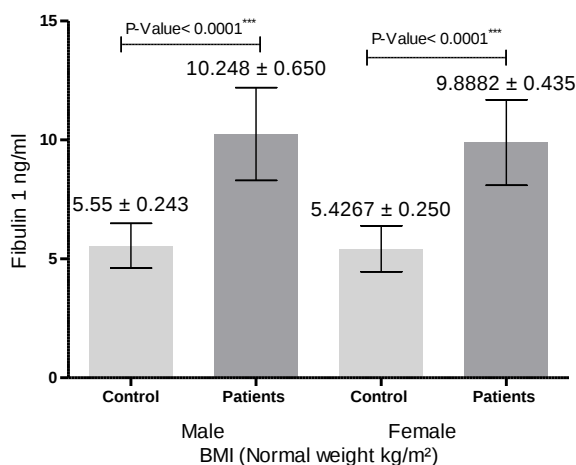


Figure 2. Fibulin-1 levels (ng/ml) of patients and control groups in normal weight

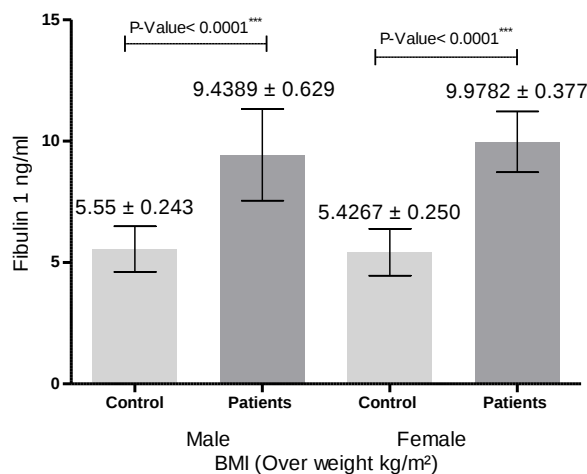


Figure 3. Fibulin-1 levels (ng/ml) of patients and control groups in over weight

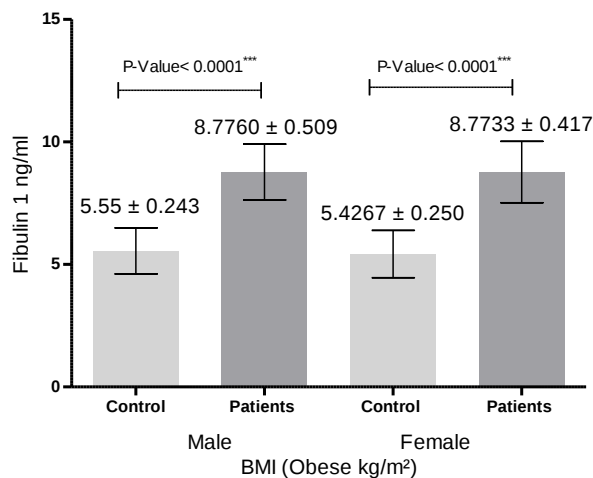


Figure 4. Fibulin-1 levels (ng/ml) of patients and control groups in obese weight

The figures (5), (6), (7) reveal that there is a significant negative correlation ($P \leq 0.05$) between Fibulin-1 (ng/ml) and T3 levels (ng/dL), a significant positive correlation ($P \leq 0.05$) between Fibulin-1 (ng/ml) and T4 levels ($\mu\text{g/dL}$) and a significant positive correlation ($P \leq 0.05$) between Fibulin-1 (ng/ml) and TSH levels (mU/L) of hyperthyroidism patients.

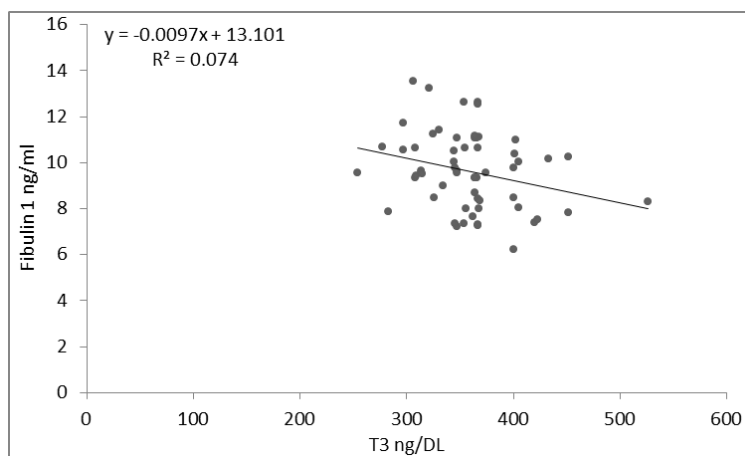


Figure 5. Correlation between Fibulin-1 level (ng/ml) and T3 (ng/dL) in hyperthyroidism patient groups

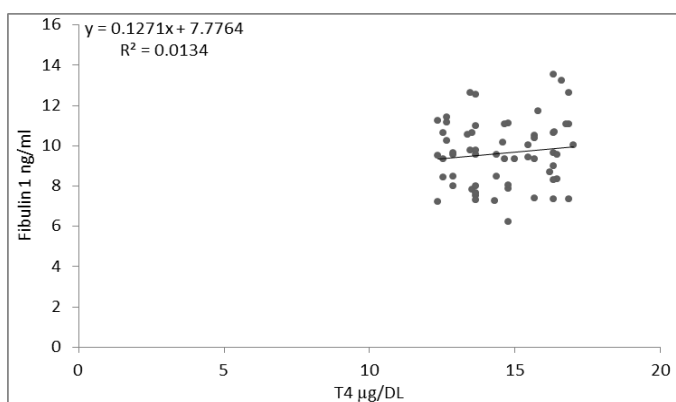


Figure 6. Correlation between Fibulin-1 level (ng/ml) and T4 (ng/dL) in hyperthyroidism patient groups

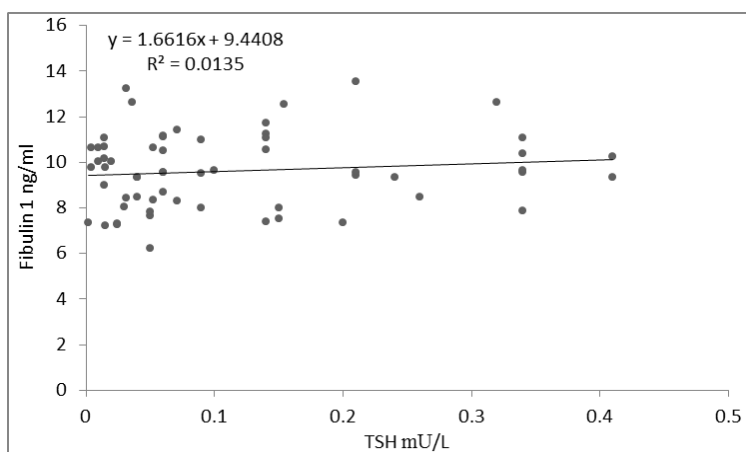


Figure 7. Correlation between Fibulin-1 level (ng/ml) and TSH (mU/L) in hyperthyroidism patient groups

Discussion

The study has revealed a considerable increase in Fibulin-1 level when comparing patient's groups to control groups according to age as shown in table (1). The studies revealed that there was an evidence of Fibulin-1 upregulation when treating breast cancer cell lines with triiodothyronine (Figueiredo *et al.*, 2014). While there is a high linkage of fibulin-1 and fibronectin levels in the structure of extracellular matrix, fibronectin is also affected positively by thyroid hormones secretion thereby both levels of fibulin-1 and fibronectin levels rise when there is an elevation of thyroid hormones secretion (Taglieri *et al.*, 2017; Sang *et al.*, 2021).

The results showed that there was no significant relation to age differences. The studies suggested that Fibulin-1 level is more dependent on the severity of hyperthyroid secretion thereby its increases by chance depending on when does a patient has a hyperthyroid disorder (Bonnans *et al.*, 2014; Lazensky *et al.*, 2017). Also noticed a rise in Fibulin-1 level when comparing patient to control groups according to gender as in table (2), and it is worthy mentioning that there was no considerable difference between males and females as shown, moreover it is more dependent on thyroid secretion intensity. This study additionally indicates an elevation of Fibulin-1 level in different weight groups as displayed in figures (2), (3), (4). The studies reveal that there is a probable revelation between weight and Fibulin-1, as in (Salie *et al.*, 2022) study,

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